

AN INTERMEDIATE COMMERCIAL GEOGRAPHY

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PART II

THE ECONOMIC GEOGRAPHY OF THE
LEADING COUNTRIES

SIXTH EDITION

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PREFACE

ONE of the most difficult stages in an educational career is the transition from school to university. It is true that there is not now quite the same sharp contrast as there was formerly between the rigid discipline of the school class-room and the freedom of the lecture-room, or between the orthodox lesson and the frequently almost heterodox lecture. Usually, however, there is a fundamental difference of outlook between the schoolmaster and the university professor which is reflected in varying degrees in the student. Whatever our educational system, it is but right that a large proportion of our schooldays should be devoted to the acquisition of facts: to the schoolboy the printed word of the text-book is above suspicion; it is accepted without question as the truth and stands thus as necessary knowledge to be acquired. It comes almost as a shock to the young university student to find text-book dogmas doubted or even ridiculed, statements questioned and others classed as old-fashioned.

Armed with a sound knowledge of facts, the university student should be in a position to develop a broader outlook, a critical faculty, and a capability of bringing his knowledge up to date from sources outside the text-book.

This book has been written with the object of bridging the gulf. It is, as far as possible, self-contained, but assumes a certain knowledge of ordinary geography as taught in schools. The first part breaks away from the bonds of political boundaries and attempts to treat of the essentials of economic geography on a world basis, that is, on a basis of commodities and world trade. Within the modest compass of a text-book intended for university students who have probably three or four other subjects to consider it seemed impossible to deal with the regional geography of the whole world and then to add thereto further details of foreign trade. The second part of the book gives, therefore, a brief recapitulation of the main aspects of the regional geography of the continents to serve as a foundation for the consideration of the economic or commercial geography of certain of the more important countries of the world. The selection of countries may seem arbitrary and is obviously open to criticism, but it must be borne in mind that all

the countries of the world have been taken into consideration in Part I.

The book is intended for use mainly in the great English-speaking countries of the world. For that reason the treatment of the United States and the integral parts of the British Empire has been made rather more complete than in the case of other countries.

Students are often greatly confused by the varying units adopted in expressing quantities and values. With a few exceptions metric tons, gold dollars, and pounds sterling have been used throughout, but factors for conversion into all the common units will be found in their appropriate places.

The writer on economic geography, in common with all writers on economic subjects, is rather in the position of the girl pillion rider who, in the course of a joy ride, exclaims to her pilot, "This is a pretty village, wasn't it?" A text-book is no sooner written than it is liable to become out of date. While the text-books are bemoaning the coming cotton famine, based on the registered decline in 1914-1923, the world outside is faced with the stupendous over-production of 1926. Every effort has been made to prevent this book from becoming out of date by indicating to the student where the latest information or most recent statistics may be found. This serves the triple purpose of keeping the book always up to date, giving the student a valuable exercise, and acquainting him with the original sources. At the same time the first year at a university is a crowded one, the student has only a limited time for each subject. The graphs, diagrams, and tables in this book have, therefore, been constructed, purposely, from a strictly limited number of sources so that the student is brought into contact with a small but very important series of source books. Thus in Part II the diagrams for foreign trade have been drawn up from information published annually in the *Statesman's Year Book* or the *Annual Reports on the Balance of Trade* (League of Nations), because both are important works of reference which should be familiar to all students. At a later stage, the more advanced student, on the other hand, would naturally consult the statistical publications of the countries concerned. In this connection it may be noted that the present volume forms a natural introduction to Chisholm and Stamp's *Handbook of Commercial Geography* (Longmans).

This book has been written to meet the needs of the present-day student, the test questions and exercises have therefore been selected from examination papers set in recent years by various universities and other educational bodies. For permission to reproduce such questions, I am indebted to the requisite authorities in the Universities of Alberta, Bristol, British Columbia, Harvard, Lahore, Leeds, Liverpool, London, Oxford, Rangoon, Sheffield, Toronto, and West Ontario.

No apology is tendered for the inclusion of matter in this book which purists may regard as not strictly "geographical." The rigid delineation of subjects is surely a remnant of the past and certainly far from conducive to progress.

In the details of the preparation and publication of this book, have been ably assisted by Miss D. M. Fisher, B.A., whose help is gratefully acknowledged.

L. DUDLEY STAMP.

LONDON SCHOOL OF ECONOMICS.

NOTE TO PART II

In addition to the detailed treatment of the more important countries of the world, I have added, in response to several requests, brief notes on the smaller countries, indicating as far as possible in a few words their salient features. For the preparation of many of the diagrams in this part I am greatly indebted to Miss W. Hunt, B.Sc. (North America and Spain), and to Miss D. M. Fisher.

L. D. S.

LONDON SCHOOL OF ECONOMICS,
1928.

NOTE TO THE SIXTH EDITION OF PART II

Extensive corrections have been made in this edition, notably in the section on Africa, and for help here I am greatly indebted to my colleague, Mr. S. H. Beaver.

L. D. S.

LONDON SCHOOL OF ECONOMICS,
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CHAPTER XV

NORTH AMERICA

GENERAL CONSIDERATIONS

Position and Size.—North America is the third largest continent, being next to Asia and Africa in size. It has an area of nearly

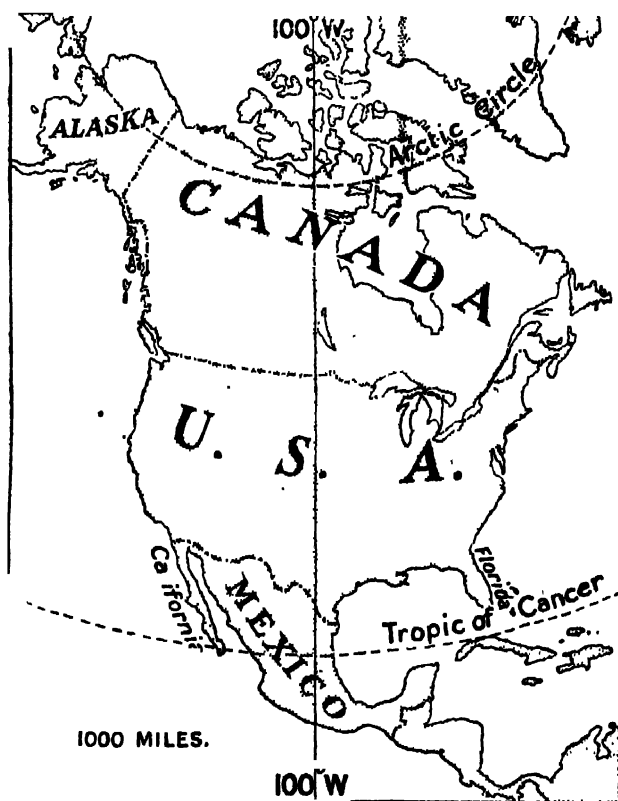


FIG. 201.—The position and size of North America.

eight million square miles and is 6,000 miles from north to south. Fig. 201 shows that by far the largest proportion of the continent lies in the north temperate zone and only a small portion—Central

America, the West Indies and part of Mexico—within the tropics. The position of the Arctic Circle and the Tropic of Cancer should be carefully noted. The latter lies to the south of the peninsula of Florida, but just cuts the tip of the peninsula of Lower California. It is useful to remember that latitude 49° N. marks the boundary between Canada and the United States for a considerable distance. Longitude 100° W. roughly bisects the tapering, triangular land mass of North America.

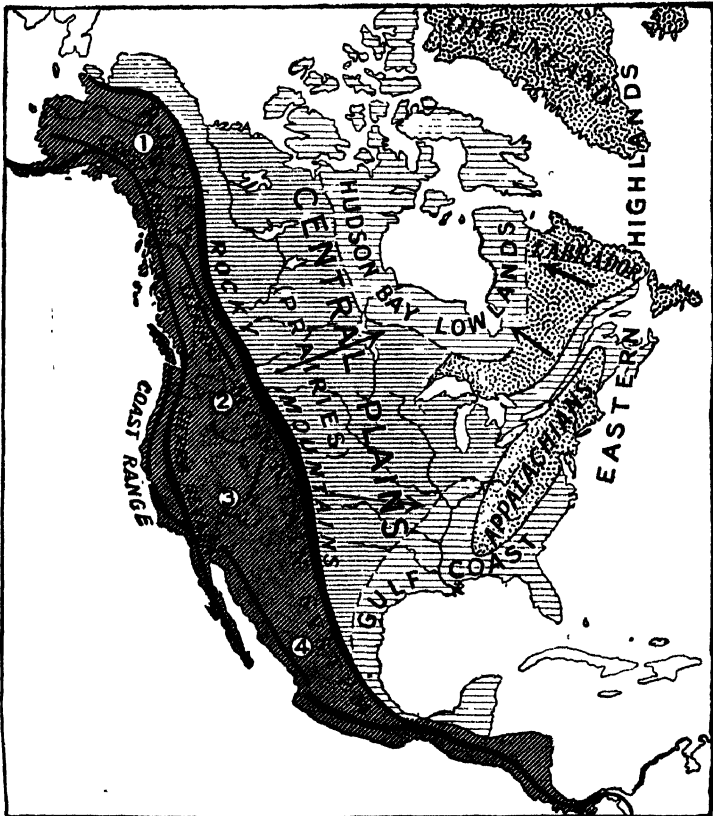


FIG. 202.—The main physical features of North America, showing the three main physical divisions of the continent.

The arrows indicate the direction of slope of the Central Plains and the Plateau of Labrador. 1=Plateau of Yukon; 2=Columbia Plateau; 3=Colorado Plateau; 4=Plateau of Mexico.

Physical Features.—North America falls very simply into three divisions :

1. The Western Mountains, or Rocky Mountain System.
2. The Central Plains.
3. The Eastern Highlands.

The Rocky Mountain System comprises the whole complex of young folded mountains occupying the western third of the continent. In the north, that is in Canada, the individual ranges are comparatively close together and the intermontane plateaus relatively narrow. The beautiful Coast Range is there succeeded by a series of small plateaus, followed inland by the lofty Selkirk Range and finally by the Rocky Mountains themselves—the highest of all. Further south, in the United States, the Coast Ranges (which are not continuous with the Coast Range of Canada) are separated by the Pacific valley from the Cascades and Sierra Nevada. Between the Sierra Nevada and the Rocky Mountains themselves lies the region of great plateaus. In each case it should be noted that the Rocky Mountains proper form the easternmost range of the whole system. Passing into Mexico the Rocky Mountain System again becomes narrower and passes finally as a single chain through the Isthmus of Panama.

The Central Plains occupy nearly the whole of the centre of the

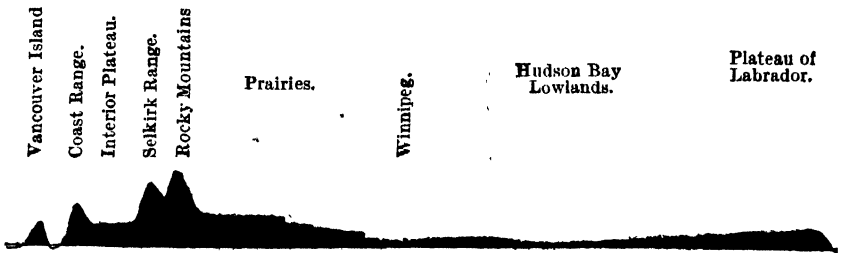


FIG. 203.—Section across North America from west to east, roughly along the line of the Canadian Pacific Railway.

continent. Although over huge areas the land is nearly flat or only gently undulating, the central plains must not be thought of as *lowland*. There are two great areas of lowland, one round Hudson Bay and one round the Gulf of Mexico. These two lowland areas are nearly connected along the line of the Mississippi and Red Rivers and the region round Lake Winnipeg. But westwards the ground rises very gently and gradually, becoming higher and higher until the foot of the Rocky Mountains is reached.

The Eastern Highlands consist of several detached units—the Appalachian system of mountains; the Plateau of Labrador formed by part of the old Laurentian Shield, and the high Plateau of Greenland. Between the southern part of the Appalachian Mountains and the Atlantic Ocean is an important coastal plain; between the Appalachian system and the Labrador Plateau lies the St. Lawrence valley. The Labrador Plateau slopes gradually westward to the Hudson Bay lowlands.

The great water-parting in the continent is formed by the main

Appalachian System to the Atlantic Ocean. The falls on the rivers of the last group were important before the days of hydro-electric power, and the site of many of the towns of New England has been determined by the presence of a waterfall whose energy could be used to operate the machinery of the early mills. Fourthly, there are the Nelson, Churchill, and other rivers draining into Hudson Bay, which are likely to become important.

As sources of water for irrigation.—Irrigation is of great importance in the dry western States, where no less than 18,000,000 acres—an area equal to half England—were irrigated even as long ago as the period of the 1920 Census. In the Province of Alberta, on the dry western prairies, irrigation is of steadily increasing importance.

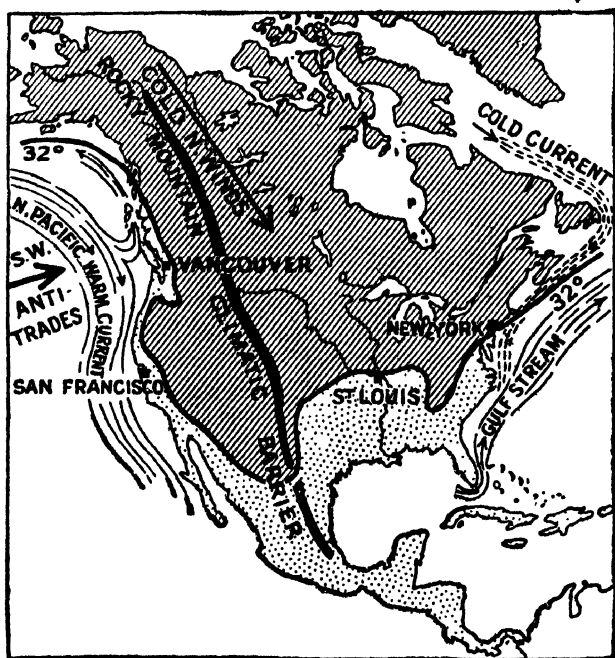


FIG. 205.—The temperature of North America in January.

Where the North Pacific current flows southwards it is actually a cool current.

Geology.—The Rocky Mountain System, like most of the great fold mountains of the world, is mainly of Alpine or Tertiary Age. It includes a great variety of rocks; there are numerous intrusive masses of igneous rock and extrusions of lava and many areas are highly mineralized. Among the gently folded later rocks on the flanks, notably in California, lie many of the world's richest coalfields.

The Appalachian Mountain System is a folded complex of earlier date. On the western flanks lie the greatest coalfields in the world—the Pennsylvanian fields.

Occupying the whole of the north-east of the continent is the Laurentian Shield, a vast complex of ancient metamorphic rocks, riddled with intrusive masses of granite and other igneous rocks also of great antiquity. This is another highly mineralized area.

The strata forming the Great Plains are for the most part little disturbed, and consist of sedimentary rocks of varying age. The mineral riches of this central tract consist mainly of coal and oil, except where, as in the Ozark Highlands, underlying older rocks appear at the surface.

During the Great Ice Age the whole of the north of the continent

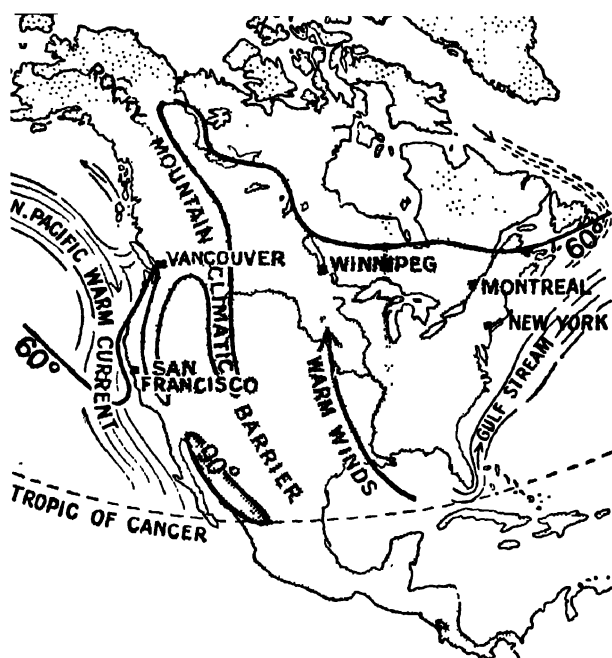


FIG. 206.—The temperature of North America in July.

Notice that the surface temperature line of 60° almost reaches the Arctic Ocean, illustrating the hot summer of the Tundra.

was covered by a great ice sheet. When the ice retreated it left behind in places a great mantle of glacial drift, whilst over the harder rocks of the Laurentian Shield the ice-sheet scooped out innumerable hollows occupied to-day by the lakes which are such a characteristic feature of this part of Canada.

Climate.—Two physical factors are of paramount importance in influencing the climates of North America. One is the north and south alignment of the Rocky Mountain system, which provides a remarkable and almost complete barrier to the penetration of the Westerlies or Anti-Trade winds. In a much smaller way the

Appalachian system acts as a barrier. The other is the absence of any east and west barrier, so that the central plains in winter are open to the full influence of Arctic conditions from the north whilst in summer they are open to the penetration of rain-bearing winds from the Gulf of Mexico in the south.

Winter conditions are illustrated in Fig. 205. It will be noticed that, owing to the presence of the Coast Range in Canada, the Cascade Range and Sierra Nevada in the United States, the warming or moderating influence of the South-Westerlies and the

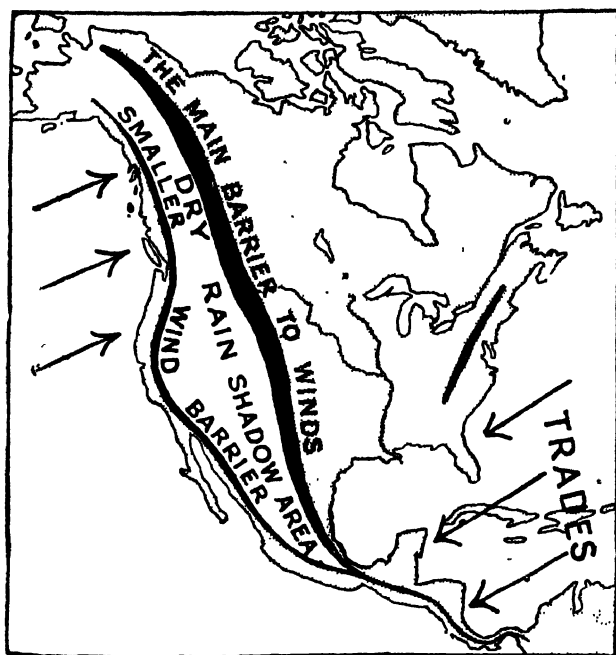


FIG. 207.—The mountain ranges and regular winds of North America.
Compare this map carefully with the rainfall map.

North Pacific Drift is practically restricted to a belt along the west coast. The surface temperature line of 32° in January curves so far south as to include practically the whole of the intermontane plateaus and a very large part of the central plains, whilst a cold current influences the east coast.

Summer conditions are shown in Fig. 206. In summer, as shown by the very marked northern extension of the July surface temperature line of 60° , the heart of the continent is still cut off from the moderating influence of the sea and especially of the westerly winds, and becomes greatly heated. Fig. 207 shows the position of the North American continent in relation to the main wind systems of

the Northern Hemisphere, but the heating of the interior results in the formation of a low-pressure area towards which the trade winds flow. As a result the rainfall in the central plains decreases in amount from the Atlantic seaboard inland and falls mainly in summer. The West Indies and Central America receive a well-distributed rainfall from the trade winds. The well-distributed rainfall of New England and the St. Lawrence valley is due to the succession of cyclones or low-pressure systems in both summer and winter.

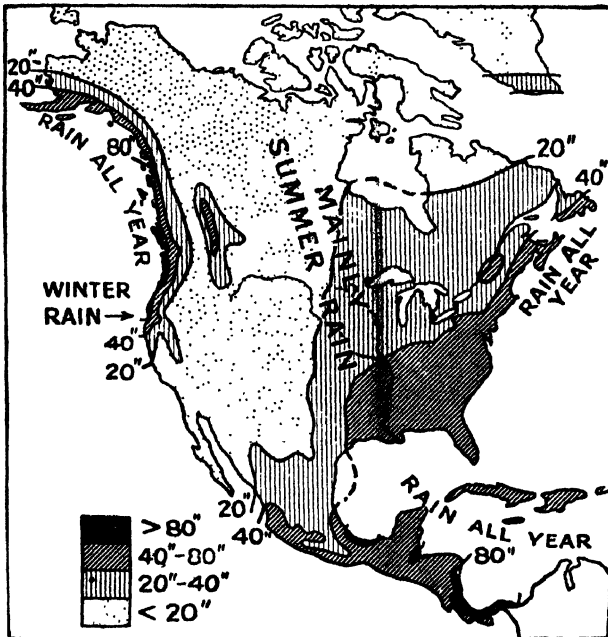


FIG. 208.—The rainfall of North America for the whole year.

Notice very carefully the good constant rainfall where the Westerlies or Anti-Trade and Trade winds are blowing for the whole year. Notice the dry plateaus between the main crest of the Rockies and the coastal ranges (rain-shadow area). Notice how the rainfall decreases from the Atlantic coast inland.

Climatic and Natural Vegetation Regions.—Collecting together the details given in Chapter IV (Part I), it will be noticed that in North America all the principal types of climate are represented with the exception of the Equatorial and the Monsoon in their typical form. Fig. 209 shows the division of the continent into broad climatic-vegetation regions. From the point of view of vegetation it must be understood that this map is very generalized, and more detailed accounts will be found under Canada and United States.

The Tundra stretches as a belt across the north from Alaska to Labrador (Arctic Climate). (See also page 302.)

The Coniferous Forest Belt lies to the south of the Tundra and also stretches right across the continent (Cold Temperate Climate). Spruce and fir are the principal trees, and this northern type of forest also occupies the higher parts of the Appalachian and Cordil-

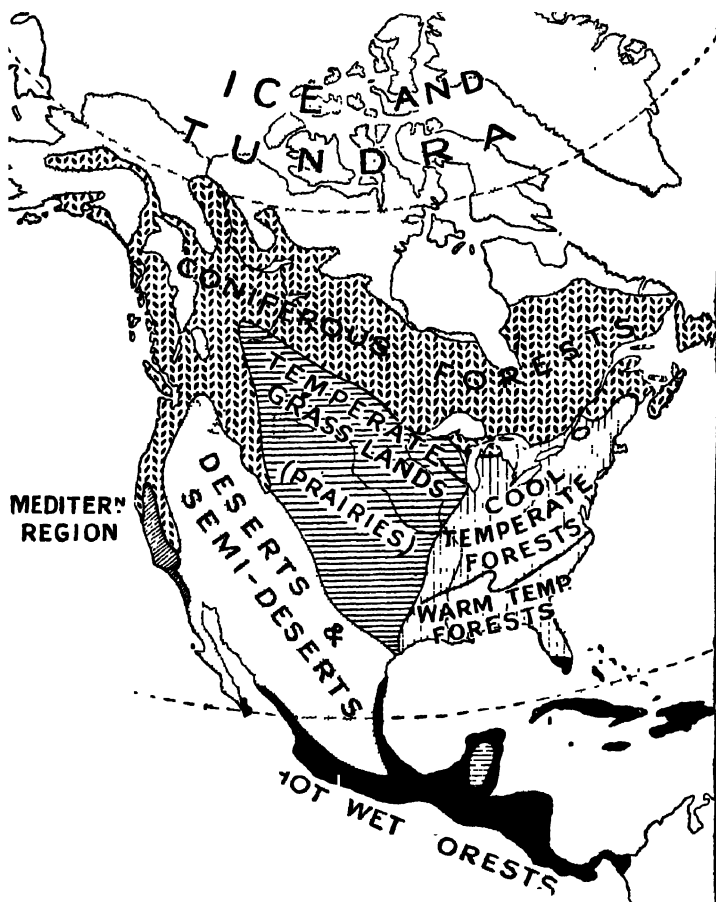


FIG. 209.—The main vegetation regions of North America.

leran ranges. The coniferous forest shown on Fig. 209 as covering a wide area in British Columbia and the north-western states (Cool Temperate Oceanic Climate) is somewhat different in character: the Douglas fir, yellow pine, and western white pine are important trees.

The Mid-Latitude Grasslands occupy roughly a great triangle in the heart of the continent and are divisible, on a basis of vegetation, into an eastern area of tall grass (prairie grassland) and a drier

western area of short grass (plains grassland) (Temperate Continental Climate).

Mediterranean Vegetation occupies a small area on the Pacific coast and consists of "chaparral"—open oak woodland and scrub—on the hills, coarse bunch grass on the plains (Mediterranean Climate).

Deserts and Semi-deserts, with a predominating vegetation of sage bush in the north and creosote bush in the south occupy the

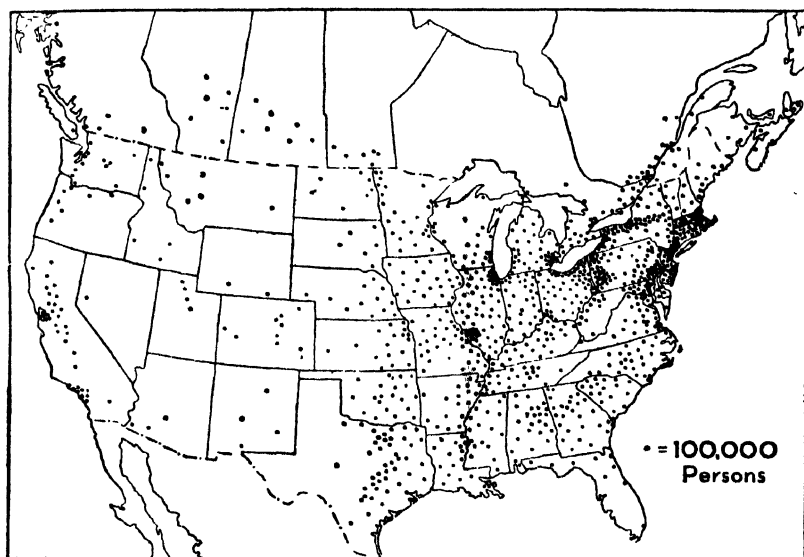


FIG. 210.—The distribution of population in North America.

Each dot represents 100,000 people in 1920 (U.S.A. census), or 1921 (Canada).

dry intermontane plateaus of the Cordilleran system of the western States and Mexico (Hot and Temperate Desert Climate).

The Northern Hardwood Forests occupy the north-eastern United States (St. Lawrence Climate).

Warm Temperate Forest, in which the long-leaf pine is the most important member of a group of about ten pines, is the natural vegetation of most of the Gulf plains and Atlantic plains as far north as Virginia. A different type of forest with many broad-leaved trees occupies the valley bottoms in the area (Warm Temperate Climate).

Equatorial Forests occupy much of the low land of Central America and the West Indies.

Population.—At the time of its discovery by Europeans, the North American continent was inhabited by American Indians, familiarly referred to as "Redskins" on account of the coppery hue sometimes exhibited by their epidermal covering. They were

organized into tribes and were for the most part hunters, roaming over the wide grasslands and living mainly on the proceeds of the chase. The development of the continent consequent upon European settlement robbed them to a very large extent of their hunting grounds: they have, in the main, proved incapable of adapting themselves to changed conditions. In the census of 1920-21 they numbered but 355,000 in Canada and the United States, despite the provision of large native reserves. The invading European cannot, however, be wholly blamed for the decline of the American Indian population. In Mexico and Central America especially the remains of fine cities of a former civilization show that the existing population at the time of Columbus' voyage had already descended far below an earlier state of civilization. Numbers are, however, on the increase in Canada, and there is increasing adaptation to rural civilization.

CANADA¹

Position and Size.—The Dominion of Canada occupies an area of roughly 3,700,000 square miles, and is thus closely comparable in extent with the United States (3,743,529), including Alaska, or with the Commonwealth of Australia (nearly 3,000,000). Actual area, however, means but little. There are huge areas of Canada at present entirely uninhabited and considerable tracts which may for ever remain devoid of continuous habitation. At the same time, Canada is capable of enormous development and of supporting many times its present population. The island of Newfoundland remains separate in government, and under the administration of the Dominion of Newfoundland is the large but sparsely populated tract of Labrador on the mainland.

The Dominion of Canada is organized into provinces. There are nine provinces, each under a Lieutenant-Governor and an elected Legislative Assembly. In addition to the main provinces there is the Yukon Territory, and the largely undeveloped lands of the north (North-West Territories) have provisionally been divided into three (Franklin, Keewatin, and Mackenzie).

Physical Features and Geology.—The ordinary relief map in an atlas gives but a poor idea of the topography of Canada, since the gradual rise westwards of the central plains to an elevation of 4,000 and 5,000 feet masks the really sharp junction with the Rocky Mountains. In the first instance Canada may be divided into three great areas:

(a) *Eastern Canada*, including the better-known part of the Laurentian Shield of ancient rocks, the St. Lawrence Lowlands, and the Maritime Provinces.

¹ Figures of production, etc., should be kept up to date from the *Canada Year Book* or *Statesman's Year Book*.

	Area in square miles	Population		
		1921	1931	
Dominion of Canada	3,684,723 ¹	8,788,483 ²	10,374,196	
Prince Edward Island	2,184	88,615	88,038	
Nova Scotia	21,428	523,837	512,846	
New Brunswick	27,985	387,876	408,219	
Quebec	594,434 ³	2,361,199	2,874,255	
Ontario	407,262	2,933,662	3,431,683	
Manitoba	251,832	610,118	700,139	
Saskatchewan	251,700	757,510	921,785	
Alberta	255,285	588,454	731,605	
British Columbia	355,855	524,582	694,263	
Yukon Territory	207,076	4,157	4,230	
North-West Territories—		7,988	7,133	
Franklin	554,032			
Keewatin	228,160			
Mackenzie	527,490			
Dominion of Newfoundland	162,734		275,756 ⁴	
Newfoundland	42,734		271,553 ⁴	
Labrador	120,000 ³		4,203 ⁴	
Total British North America	3,847,457		10,649,952	

¹ Out of the total area ascribed to Canada 137,493 is water (lakes, etc.).

² Including 485 belonging to the Royal Canadian Navy.

³ These figures have been adjusted in view of the Labrador Boundary award.

⁴ 1929.

(b) *The Central Plains* of almost undisturbed sedimentary strata varying in age from Palaeozoic in the east to Tertiary in the west. The Plains show a general rise towards the Rockies, but are divided by scarps into a series of steps. The southern part of the plains is almost or entirely treeless (see note, Fig. 211).

(c) *The Rocky Mountain System or Western Cordillera*, occupying the western portion of the country and corresponding closely with the Province of British Columbia.

(a) *Eastern Canada*.—The *Laurentian Shield* occupies an area of roughly 2,000,000 square miles in the north-east of the continent and consists of a great complex of ancient metamorphic rocks riddled by huge intrusions of granite and other plutonic rocks. Denudation and differential uplift of this ancient continent have given rise to a high south-eastern and eastern rim reaching about 1,500 to 2,000 feet in height. The rivers which have cut deep valleys in this rim and flow swiftly to the St. Lawrence Gulf or lowlands supply one of the most important water-power areas in the world. From the rim the land slopes away gradually to the shallow Hudson Bay. The whole of the Shield was covered by the great Ice Sheet and over huge areas the bare rock is exposed in a sterile, soilless country. Elsewhere are scattered drift-filled valleys and scattered patches of

boulder clay, much of which is water-logged and also sterile. Occupying glacially excavated hollows are immense numbers of lakes of all sizes, connected by intricate and irregular series of waterways. The rocks of the Shield are in many areas highly mineralized and huge tracts are still virtually unexplored from the standpoint of economic minerals. The region takes third place, after the United States and Mexico, as a producer of silver; copper and gold are important; it is the leading source of the world's cobalt and nickel, whilst its extension across the United States border has the largest production of iron ore in the world (western end of Lake Superior).

The *St. Lawrence Lowlands* have an area of about 35,000 square miles and stretch from a little below Quebec to Lake Huron, thus

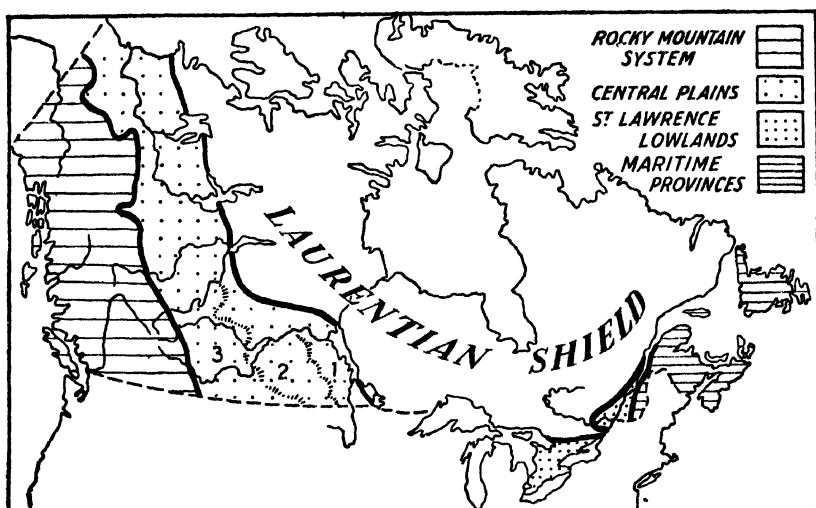


FIG. 211.

The three Prairie steps are numbered 1, 2, and 3. Notice that the Laurentian Shield stretches across the whole of the north of the three Prairie Provinces and includes what is topographically an important part of the Central Plains.

including the most densely populated parts of the Dominion of Canada and the very important Ontario Peninsula. The slightly folded old sedimentary rocks furnish excellent soils, and the climate favours mixed farming.

The *Maritime Provinces*, the extension of the Appalachian chain of the United States, include Nova Scotia, Prince Edward Island, New Brunswick, and, geographically, a portion of Quebec. The topography is hilly and rather irregular, with a dominant north-east to south-west trend comparable with that of the United States Appalachian region. Coalfields occur especially in Nova Scotia.

(b) The *Central Plains* comprise that portion of the three Prairie Provinces which lies to the south-west of the Laurentian Shield. There are three main "steps." The first step lies to the

west of Lake Winnipeg and represents the alluvial plain occupied by the former Lake Agassiz. The escarpment on to the second step, which has a rolling surface, deeply cut into by the large river valleys, is 500 to 1,000 feet high. The third step lies at an elevation of 2,000 to 4,000 feet, and has a still more irregular surface with scattered flat-topped hills and gorge-like river valleys. Reference will be made later to the important coal basins underlying the prairies.

(c) *The Western Cordillera* occupies the whole of British Columbia and a narrow strip of Alberta (since the British Columbia-Alberta boundary lies along the Rocky Mountains Divide). The main features are the great Rocky Mountain Range on the east and the Coast Range on the west with an intervening area of great river troughs running parallel to the main ranges, dry, even arid,

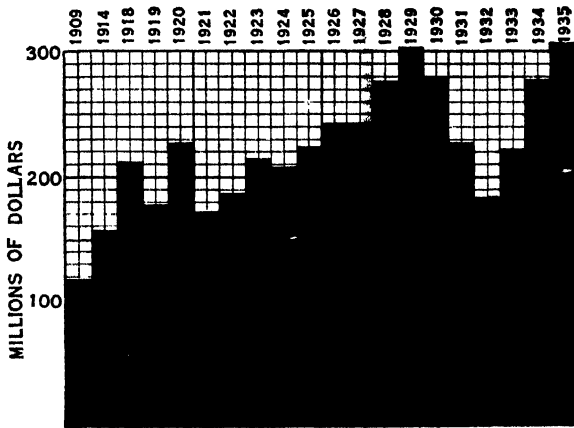


FIG. 212.—Graph showing the growth of the mineral production of Canada.
Keep up to date from the *Statesman's Year Book* or *Canada Year Book*.

plateaus, and subsidiary mountain ranges of which the Selkirk Range is the most important. Cultivation is of necessity restricted almost entirely to the broader valleys, especially near the Pacific coast, but large areas of the mountains are forested. Many areas are rich in minerals—lead, silver, copper, and gold, with coal basins on the eastern flanks (Crow's Nest) and western flanks.

Minerals.—The value of the annual output of minerals from Canada has shown a steady increase from \$10,221,000 in 1886 to well over \$200,000,000 in post-War years (1923 onwards) (\$310,000,000 in 1935). There is considerable ground for the belief that Canada is likely soon to become the leading mineral-producing country of the world. The coal resources are immense; the deposits of asbestos, cobalt, and nickel are unrivalled in the world, and Canada is now the second producer of gold after South

Africa, passing the United States total in 1933. Arranged in order of value in 1933, the leading mineral products are gold (over a quarter of the total), coal, copper, nickel, natural gas, lead, zinc, silver, and asbestos. Cement must be added to the list as taking a high place.

Coal.—Despite the enormous reserves of coal in Canada, which were mentioned in Part I, more than half the coal at present consumed is imported from the United States. This is because the coal lies mainly in the eastern provinces (Nova Scotia and New Brunswick) and in the western provinces (Alberta, Saskatchewan, and British Columbia) so that the thickly populated parts of Ontario and Quebec are more easily and economically supplied with coal from the nearer fields of Pennsylvania and Ohio. The output of Canadian coal has remained comparatively steady, and from 1912 to 1935 has only fluctuated between $13\frac{1}{2}$ and 17 million tons. Very roughly, equal quantities are produced in Nova Scotia and Alberta, with smaller quantities from British Columbia, Saskatchewan, and New Brunswick. In Nova Scotia the coalfields are of Carboniferous

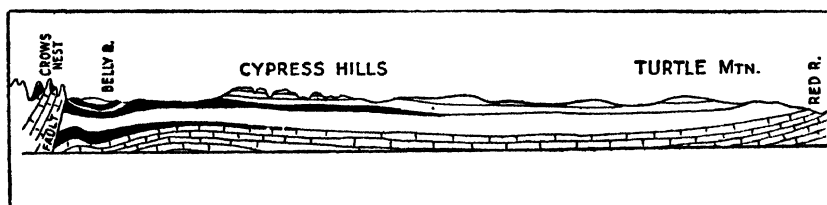


FIG. 213.—Section across the Prairie Provinces.

The principal coal-bearing horizons shown in black. The level nature of the coal measures, which are of Cretaceous and Tertiary ages, should be noted.

age and form a continuation of the Appalachian series of the United States. The fields are comparatively small, the principal one being the Sydney Field along the seaboard of the Gulf of St. Lawrence. Underlying the prairie provinces of Alberta and Saskatchewan are vast fields of bituminous and semi-bituminous coal as yet little worked. The principal fields are at Crow's Nest Pass, where the coal measures—of Cretaceous age—crop out in the foothills of the Rockies, and around Drumheller on the Prairies (see Fig. 213). The coal of British Columbia is, on the whole, of better quality than that of the prairies, and occurs mainly in fields near the borders of Alberta, with less important fields on the west in Vancouver Island and Queen Charlotte Isle. It should be remembered that the huge water-power development in Canada takes the place of a large quantity of coal. It is estimated that the 7,500,000 installed horse-power (1935) represents a saving of 45,000,000 tons of coal per annum—double Canada's total average production.

Gold.—Canada has been a gold-producing country for over sixty years. In the late 'fifties, placer gold was discovered along the

Thompson River, and in 1858 there occurred the famous rush to the Fraser River. The discovery of gold in the Yukon River was made in 1869, but the rich discoveries in the creeks of the Klondike River at the present Dawson City, and which caused the greatest gold rush in history, date only from 1896. Within four years the Yukon production reached its highest point (1900—1,350,057 oz. fine gold). On this account the Canadian production reached a maximum in 1900, after which followed ten years of steady decline. The curve of production is not unlike that of Australia or of New Zealand, but with a maximum in 1900. But Canada has been saved from the present position of Australia by the important lode mine discoveries in Ontario, which has been the leading producer since 1914 and has now an output of over 2,000,000 oz. annually (3,283,000 oz. in 1935). The famous mines of the Porcupine and Kirkland Lake areas are now only two of a long chain in the Canadian Shield. British Columbia still has a good output, but the Yukon has sunk to insignificance.

Nickel.—With the exception of nickel in the ores of the Cobalt district, the Canadian production of nickel is derived almost entirely from the nickel-copper deposits of the Sudbury district of Ontario. A record output of 138,500,000 lbs. was reached in 1935, valued at \$35,345,000. The production has been increasing steadily since 1921-22, when there was a severe slump. Reserves are estimated to contain 2,000,000 tons of nickel. In 1929 Canada produced over 85 per cent. of the world's nickel.

Lead.—Lead in Canada is obtained mainly in British Columbia in the East and West Kootenay districts, and to a less extent in Ontario, Quebec, Nova Scotia, and Yukon Territory.

Copper.—The production of copper is mainly from the Sudbury deposits of Ontario and from British Columbia in the Skeena, Trail Creek, and Vancouver mining divisions. The huge output of 1918 was followed by the inevitable slump, from which production has now recovered, reaching over 190,000 metric tons in 1935, and copper now ranks as Canada's third mineral product, about 6 per cent. of the world's total.

Silver.—The silver of Canada is mainly from the copper-gold-silver or silver-lead-zinc ores of British Columbia (Kootenay, etc.), the nickel-copper deposits of Sudbury (Ontario) and the famous old silver-cobalt ores of Cobalt (Ontario).

Asbestos.—Canada produces more asbestos than any other country—in 1923, 83 per cent. of the world's total—the chief workings being in the eastern townships of Quebec, near Black Lake and Thetford.

Zinc.—Zinc is recovered at the reduction works of Trail (British Columbia) from the lead-zinc ores of the Kootenay districts, and from various workings in Eastern Canada.

Cement.—The raw materials for the Portland Cement industry

are found in the St. Lawrence lowlands. During the war Canada changed from a cement importer to a cement exporter.

Other minerals include *cobalt* (from Cobalt, Ontario), platinum, petroleum and natural gas (both mainly from Alberta and the Ontario Peninsula), gypsum, and salt (each normally over \$1,000,000 in annual value) and many others.

The Climate of Canada.—The climatic conditions have already been sufficiently dealt with in Part I (see especially Figs. 49, 51, and 54) and under North America.

Natural Vegetation of Canada.—Some further details may here be given of the natural vegetation regions mentioned under North America. Out of a total land area of 3,650,000 square miles,

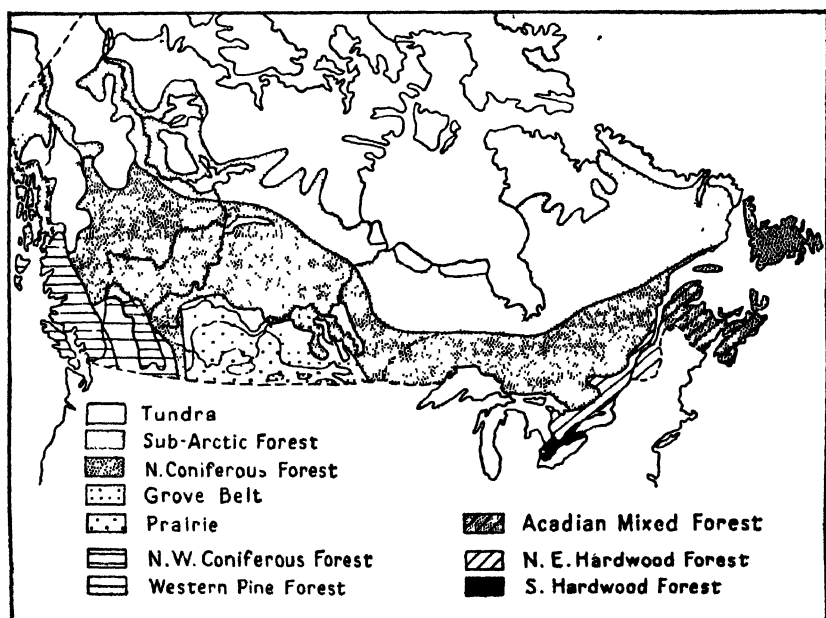


FIG. 214.—The natural vegetation of Canada.

existing forests cover approximately 1,227,000 square miles. In order to correlate the Canadian forests with the United States forests which will be described later, the same subdivisions will be used.

Forests.—

(a) The Southern Hardwood Forests of the United States containing oak, chestnut, etc., stretch over the border into Canada along the northern shore of Lake Erie and western part of Lake Ontario. Northwards this fades into

(b) The North-Eastern Hardwood Forests of the United States, with maple, elm, basswood, oak, birch, hickory, and beech, and with patches of conifers on the lighter soils. These

occupy the St. Lawrence valley—an area which has been very largely cleared.

(c) The Northern Coniferous Forest has white spruce as the predominating and most important species. In the east balsam fir is an important associate, whilst aspen-poplar has become dominant on burnt-out areas. White pine is important on lighter soils, together with red pine. In the “Acadian Belt” of the Maritime Provinces red spruce, white spruce, and balsam fir predominate. The northern forest stretches right across Canada and runs southwards along the higher parts of the Cordilleran Mountains. The transition from the Northern Forest to the Prairies is a gradual one. North of the prairies is a broad “grove belt” in which aspen-poplar is important; this passes gradually into the Northern Coniferous Forest. Northwards the Coniferous Forest passes gradually into the tundra, with tree growth confined to narrow strips along waterways.

(d) The North-Western Coniferous Forest of the United States extends northwards into Canada and occupies the Pacific slopes of the Coast Range. Douglas fir and red cedar are the dominant species associated with hemlock and western white pine. This type of forest reappears in the Interior Wet Belt.

(e) The Western Pine Forest of the United States with western yellow pine and Douglas fir predominates in the Interior Dry Belt. On the higher ranges of the Rocky Mountain System the Northern Coniferous Forest with spruce and Alpine fir predominates.

Grasslands.—The division into long grass and short grass continues from the United States into Canada, and reference should be made to what is said under United States.

Forest Products.—Out of the total area of 1,151,500 square miles still covered by forest in Canada only about 27 per cent. carries “merchantable” timber (6 inches in diameter and upwards), and only about 20 per cent. carries “saw” timber, fit for lumber. There is estimated to be a reserve of *softwood* of 100,000 million cubic feet of lumber-timber and another 100,000 million cubic feet good enough for pulping. The reserves of hardwood are 3,000 million cubic feet of saw-timber and 39,000 million cubic feet of smaller stuff. The annual consumption of timber has increased enormously in recent years. In 1924–28 it was estimated to be 2,900 million cubic feet, and is probably now well over 3,000 million. The total value of forest products is now over \$300,000,000—more than the value of mineral products.

The Lumber Industry.—The manufacture of lumber, laths, hinges, and other products of the saw-mill forms the second most important industry in Canada depending on the forest for its raw

materials. Spruce, Douglas fir, and white pine are easily the most important softwoods. British Columbia produces more than one-third of the total, Eastern Canada most of the remainder. The forests in the north of the Prairie Provinces are important mainly as local sources of supply for the prairies. Apart from sawn lumber about 16,000,000 railway sleepers, 1,000,000 poles for telegraph lines, etc., 14,000,000 fence posts and huge quantities of firewood are consumed annually. The quantity of hardwood produced is only about one-twentieth that of the softwood, and is mainly from the eastern provinces. The leading species are yellow birch and maple.

The Pulp and Paper Industry.—The manufacture of pulp and paper is a comparatively recent development in Canadian industry, but is now of first-rate importance. Some details of the industry were given in Part I (pp. 187–188). Three stages of production may be distinguished—the cutting of the pulpwood in the forest, the manufacture of pulp and the manufacture of paper. The three operations may, but not necessarily, be carried out in separate regions. The export of pulpwood has remained practically stationary for many years, but there has been an enormous increase in the manufacture and export of pulp and paper. Nearly the whole export goes to the United States, and it is said that two-thirds of the United States newspapers are printed on Canadian paper.

Forest Policy.—It is estimated that 60 per cent. of the original forests of Canada have been destroyed by fire, 13 per cent. have been cut for use, 27 per cent. thus remain, and this reserve is being used up very rapidly. Unless regeneration is carefully assisted, valuable forest tends to be replaced by a useless growth of such forest “weeds” as aspen-poplar. It is to be feared that annual increment of good lumber is not nearly balancing the annual consumption.

Wild Animals.—For at least a century and a half, during the French *régime*, the fur trade was of paramount importance and the search for fur-bearing animals was the main incentive in the exploration of the country. The “Adventurers of England trading into Hudson’s Bay” obtained its charter in 1670, and for long the fur trade was its principal business. The opening up of the country has driven the fur-bearing animals further and further north, and there has for many years been a steady decrease in the number of pelts. The centre of collection is now Winnipeg, between 4,000,000 and 5,000,000 pelts are dealt with annually (1922–33) (5,150,000 in 1929); of these three-quarters are muskrat; other numerous ones include ermine (weasel), beaver, mink, skunk, and fox. The most valuable of the pelts are those of the silver fox. The fur trade of Canada has taken on a new aspect with the protection of certain wild species and the establishment of “fur farms,” especially of foxes.

Fisheries.—Fishing is almost certainly the oldest of all Canadian industries, and the fishing-grounds of the Grand Bank may have

been known to the Norsemen, or Northmen, long before the discovery of America by Columbus. The fishing-grounds of the Dominion are probably the most extensive in the world. They fall into four groups: the Atlantic Fisheries, the Inland Fisheries, the Pacific Fisheries, and the Hudson Bay Fisheries.

The Atlantic Fisheries extend as shown in Fig. 215 and include both inshore and deep-sea fishing-grounds. Cod, halibut, haddock, hake, herring, and mackerel are the leading fish, with lobsters especially along the coasts and, locally, oysters. The salmon, shad, alewife, and others from the estuaries and inland waters of the Maritime Provinces may be added, and the sardine canneries noted.

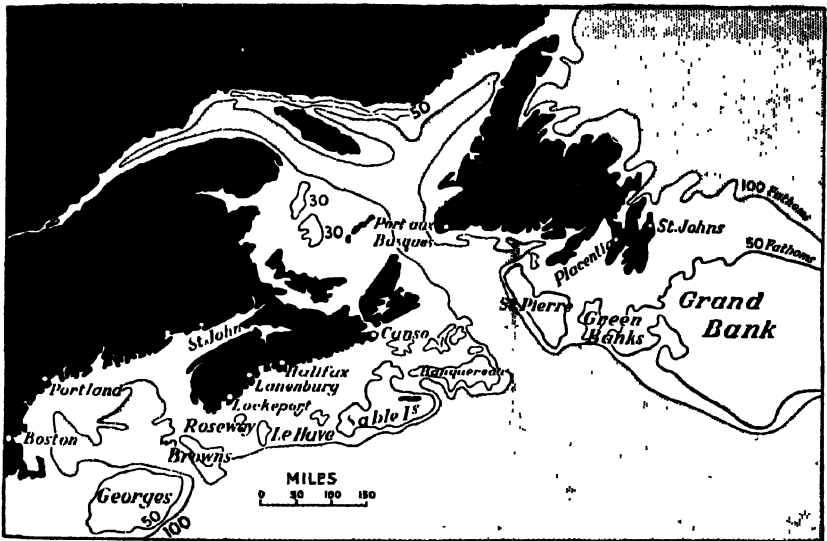


FIG. 215.—The Atlantic Fisheries of Canada.

The presence of a broad continental shelf provides ideal breeding grounds. The principal 'banks' are shown.

The Inland Fisheries comprise those, in particular, of the Great Lakes and the tributaries of the St. Lawrence. Whitefish, trout, pickerel and lake herring are the principal species. The Great Lakes, once teeming with fish, were recklessly depleted, hundreds of thousands of tons of fish being used merely as fertiliser, and the recovery from this early ill-treatment has been but gradual.

The Pacific Fisheries have, since 1918, surpassed in importance the famous old fisheries of the Atlantic. The estuarine salmon fisheries of the Skeena, Fraser, Nass and other rivers are responsible for two-fifths of the fish products of Canada, but of recent years increasing attention has been paid to other coastal and deeper sea fish—especially halibut, herring—and also to whale fishing.

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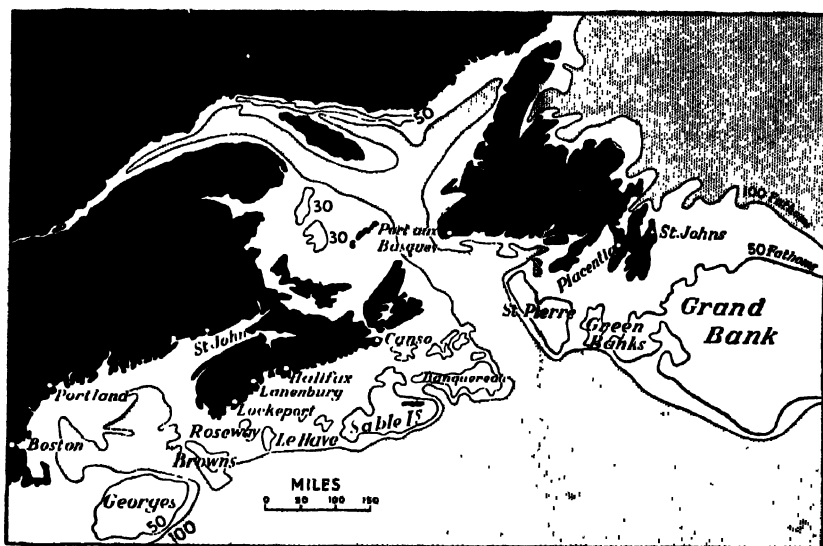


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The total value of the Fisheries of Canada reached a maximum in 1918 of over \$60,000,000. In succeeding years it has averaged rather over two-thirds of that amount. In quantity salmon, cod, and herring are close rivals, in value the salmon easily leads. About 60 per cent. of the total catch is exported; fresh fish to the United States, canned salmon and lobster to Great Britain and other parts of Europe; salted cod to the West Indies and to the Catholic countries of South America.

Agriculture.—Agriculture, including stock-raising, is the principal occupation of the Canadian population. It supplies work to about one-third of the working population and in addition provides the raw material for many Canadian manufactures. The agricultural regions of Canada fall naturally into three areas between which there are marked contrasts:

(a) *Eastern Canada.*—The St. Lawrence Lowlands and Maritime Provinces, where mixed farming, dairying, and fruit farming are the rule, and where farming has been modelled on European lines since the days of the early settlers.

(b) *The Prairies.*—Constituting the great wheat-farming area where dairying and mixed farming are only commencing to be considered. Ranching is still the leading occupation in the south-west of the Prairies.

(c) *British Columbia,* where mixed farming and fruit farming are the rule, carried on of necessity in the valleys.

We shall consider these three areas separately at a later stage; we must first consider the agricultural output of Canada as a whole. The following table is included to illustrate the relative value of the various types of agricultural produce:

GROSS ANNUAL AGRICULTURAL REVENUE OF CANADA¹ IN MILLIONS OF DOLLARS

	1921	1925	1929	1935
Field crops	932	1,153	949	507
Farm animals	98	151	207	120
Wool	3	4	4	2
Dairy products	226	253	292	191
Fruit and vegetables	59	52	46	50
Poultry and eggs	51	70	108	50
Fur farming	1.5	3.6	7	4
Maple products	6	5	6	4
Tobacco	2.4	7	6	11
Flax fibre	2.2	0.7	0.4	0.3
Clover and grass seed	4.4	3.6	2.1	1.7
Honey	—	4.1	2.8	2.0
Total	1,386	1,709	1,631	943

¹ *Canada Year Book*, 1931. Total in 1930 was 1,240; 1931, 840; in 1932, 767; in 1933, 803; in 1934, 943.

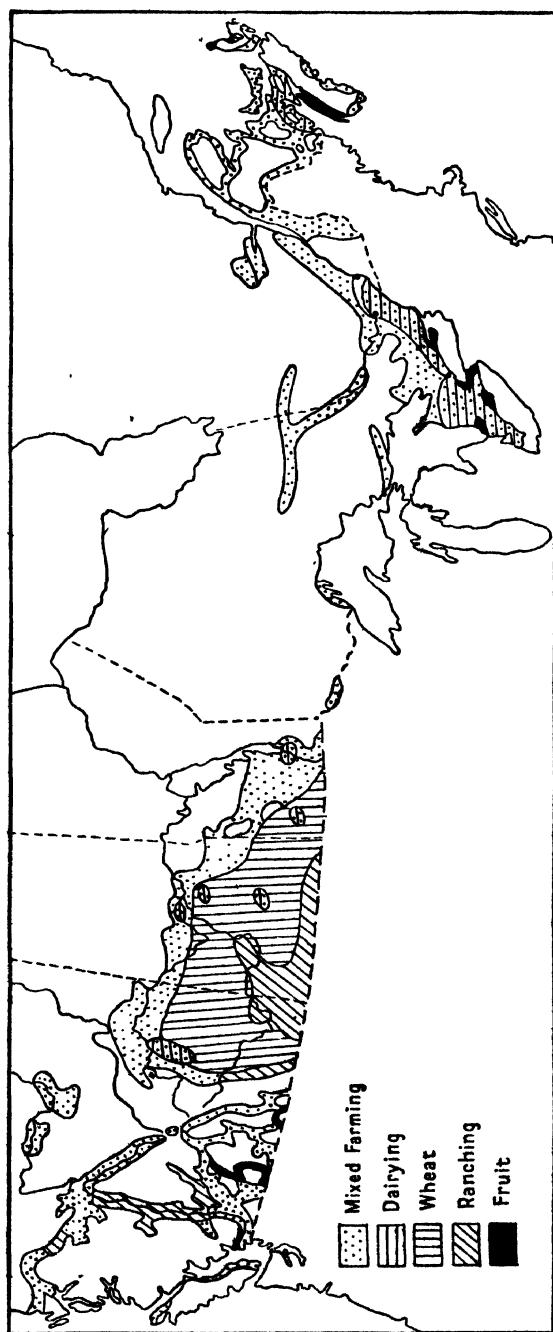


FIG. 216.—The agricultural regions of Canada.

FIELD CROPS OF CANADA—ACREAGE AND VALUE OF YIELD IN MILLIONS.

	Acreage			Value in dollars		
	1922-4	1928	1931-5	1922-4	1928	1931-5
Fall wheat	0.8	0.8	0.5	21.7	23.0	8.1
Spring wheat	21.3	23.3	25.0	303.8	403.0	142.9
Oats	14.5	13.2	13.4	190.3	211.0	86.2
Barley	2.9	4.9	3.8	42.6	76.1	21.7
Rye	1.5	0.8	0.7	14.6	11.5	2.0
Mixed grains	0.8	1.1	1.2	18.9	27.7	14.1
Potatoes	0.6	0.6	0.6	51.6	40.9	26.8
Hay and clover	9.9	10.3	8.9	174.5	171.2	109.1
Alfalfa	0.4	0.9	0.7	12.3	23.1	16.5
Fodder corn	0.7	0.4	0.4	27.7	17.2	11.7
Total, all crops	57.1	56.2	57.8	952.2	1,172.6	478.6

Wheat.—Fall, or winter, wheat is an important crop in the mixed-farming belt of the St. Lawrence Lowlands, but nearly all the wheat of the great wheat lands (the Prairie Provinces) is spring wheat—a natural result of the hard winter on the prairies. The three Prairie Provinces of Manitoba, Saskatchewan, and Alberta have over 95 per cent. of the acreage under wheat in Canada, and further details will therefore be given under the Prairie Provinces. Of the total wheat crop about 44,000,000 bushels, or 1,180,000 metric tons (1929-30), are at present required to feed the Canadian population, 44,000,000 bushels (1929-30) (1,180,000 metric tons), are required as seed, the surplus is available for export. Thus in the crop year ending July 31, 1930, exports totalled 186,000,000 bushels,¹ or 5,000,000 metric tons (including that exported as flour); in the year 1928-29, 408,000,000 bushels, or about 11,000,000 metric tons. This should be compared with the pre-war figures given in Part I, p. 99, showing that Canada exported an average of about 2,000,000 metric tons annually in 1909-13. The Canadian wheat crop is almost entirely bulk handled, and the distribution of the crops is graphically shown in Fig. 217.

Oats.—Oats form the leading cereal crop of the cold, damp Maritime Provinces, and in Quebec and Ontario and in the Prairie Provinces occupy an area of about two-thirds of that of wheat. The oat belt lies, on the whole, to the north of the wheat belt, and oats form the most promising crop possible on the agricultural lands still to be developed along the fringes of the northern forests. The bulk of the crop is retained for home consumption; exports totalled about 37,000,000 bushels (nearly 600,000 metric tons) in 1926 (only 4,000,000 in 1930), and are sent largely to the United States.

Barley.—Barley is a crop of small but rapidly growing importance, especially in Manitoba. A considerable proportion of the crops is used for malting purposes. In the agricultural development of such areas as the Clay Belt of Ontario and the Peace River

¹ These figures relate to the period before the great depression and so are retained here.

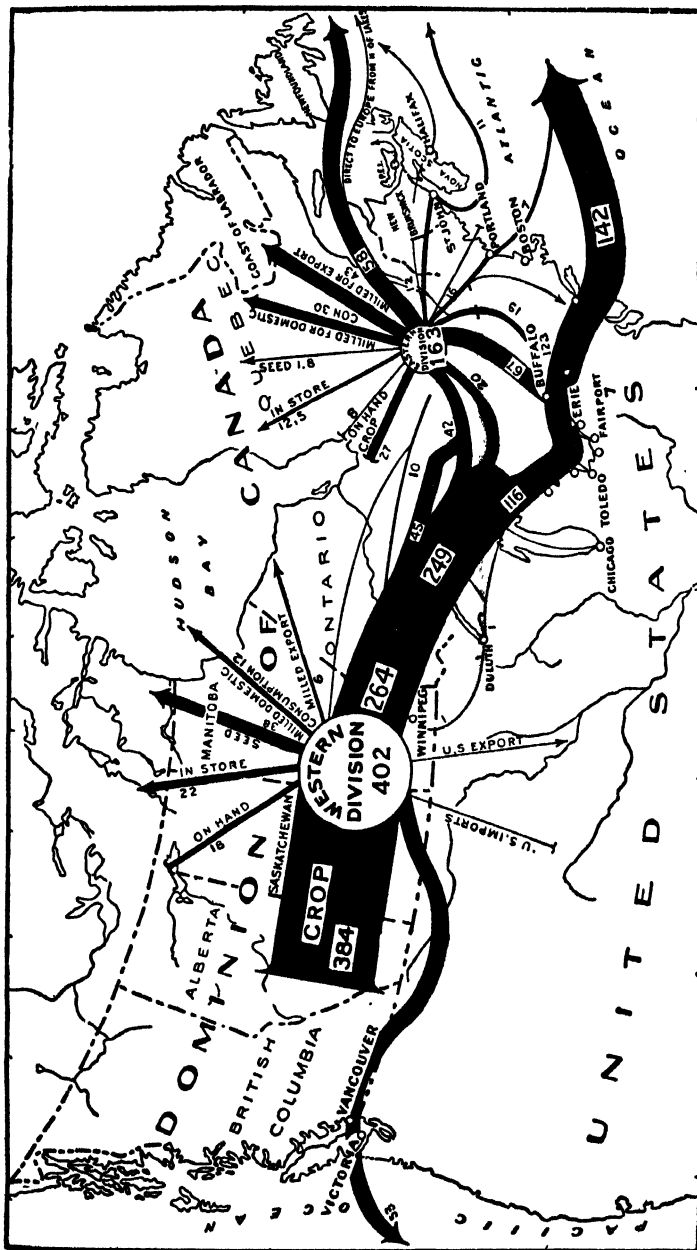


FIG. 217.—The distribution of the Canadian wheat crop (1926-27).

All figures in millions of bushels. Movements of less than a million bushels are indicated by arrows only. 1932 crop was 428,500,000 bushels; 1935, 277,000,000. The export via Churchill on Hudson Bay should be added now to this map.

settlements, barley, owing to its more northerly range, may play an important part.

Rye.—Outside of Europe, growing about 96 per cent. of the world's crop, the United States and Canada are the only countries with a considerable rye crop. In the years 1925–29 the Canadian crop averaged over 12,900,000 bushels, over three-quarters of which was fall rye, though the bulk is grown in the Prairie Provinces.

Mixed Grains.—It is interesting to notice that “mixed grains” show a higher yield per acre than any pure cereal crop in Canada—a yield more than double the average for wheat in 1929–30. The bulk of the crop is from the dairying lands of Ontario and Quebec.

Potatoes.—Comparatively unimportant in the Prairie Provinces, potatoes form a heavy crop in the St. Lawrence Lowlands and the Maritime Provinces.

Hay and Fodder.—Hay and fodder are naturally important in all the dairy-farming regions, and the bulk of the crop is grown in Ontario and Quebec. Except in British Columbia and the Ontario peninsula, severe winters necessitate stall feeding and demand the provision of a large quantity of hay. Much corn and grain are grown as green fodder as well as root crops (turnips, mangolds, etc.).

Alfalfa.—Most of the alfalfa is grown in Ontario.

Fruit.—The wild fruits of Canada are numerous and varied, and the climatic and soil conditions in many areas are eminently suitable for commercial fruit growing. The small fruits grown for sale are more particularly for local markets, and fruit farming is often a feature of agricultural production in suburban areas. Certain districts are particularly notable as centres of fruit production—the Annapolis valley of Nova Scotia, the Ontario peninsula, and the Okanagan valley of British Columbia are outstanding; the northern shores of Lake Ontario, the Georgian Bay district, the neighbourhood of Montreal, and sheltered positions in south-western British Columbia and Vancouver Island are also important. The bulk of the Nova Scotia apple crop, which approaches and may even exceed 2,000,000 barrels, is exported to Great Britain. In the Ontario peninsula apples are again very important, but a great variety of fruit is grown in the Niagara district, including such denizens of warmer climes as grapes. In British Columbia fruit growing is an important recent development.

Other Crops.—Maple sugar and maple syrup, characteristic products of Canada of importance in confectionery, are produced mainly in Quebec; sugar beet is showing an increasing importance in Ontario and Alberta; tobacco is restricted to Ontario and Quebec. Flax, hemp, hops, seeds and bulbs should be noted.

Dairy Farming.—Dairying is one of the oldest and is now

one of the most important industries of Canada. The total value of dairy produce averaged \$139,000,000 in 1925-9, of which Ontario's share is more than one-half, Quebec's nearly a quarter, and with a rapidly increasing production from the Prairie Provinces. Since the beginning of the present century the production of creamery butter has increased nearly five-fold, but the output of factory cheese has dropped, showing a marked change in the character of the production. No statistics are available of the large output of dairy butter and home-made cheese.

Stock-rearing.—During the last few years the number of horses in Canada has remained fairly stationary, due to the increasing use of mechanical power. There has been an increase in the number of *milch cows*, but a marked decline in the number of *beef cattle*. The *sheep farming* industry suffered from a marked depression in the years following the war, but the number of sheep is now on the increase. The severity of the Prairie winter is unfavourable to sheep farming, and the bulk of the sheep (3,170,000 out of 3,700,000 in 1930) are in the St. Lawrence Lowlands and Maritime Provinces. *Pig farming* and the production of bacon is progressing, whilst the *poultry-farming* industry has assumed a real importance of recent years, due to the increased home consumption of eggs and the steady demand for table poultry.

Reference has already been made to the dairy-farming industry; beef cattle are most numerous in Alberta and Saskatchewan, which are thus the leading ranching provinces, but the number of beef yearlings is greatest in the mixed-farming area of Ontario. Pigs and poultry are also most numerous in the eastern Provinces, but increasing in importance in the Prairie Provinces.

Primary Production in Canada.—It is of considerable interest to compare the values of the principal types of primary production in Canada.

NET VALUE OF PRODUCTION	1926-28 (AVERAGE)	1935
Agriculture	\$1,475,000,000	\$943,000,000
Forestry	316,000,000	—
Fisheries	54,000,000	—
Trapping	17,000,000	—
Mining	288,000,000	310,000,000
Electric Power.	102,000,000	—
Total primary	2,218,000,000	—
Total secondary.	2,018,000,000	—
Grand total ¹	\$3,888,000,000	—

¹ Grand total: eliminating duplication.

Manufactures.—The figures given in the preceding table show the great value of "secondary production," the bulk of which is included in official returns under the general heading of "manufactures." But the term "manufactures" includes the output of dairy factories, saw mills, pulp mills, fish-canning and fish-curing

establishments and certain mineral refineries. The bulk of the secondary production thus represents the preparation of the raw material supplied by the primary industries. The war had a very marked influence on Canadian manufactures, by cutting off the supplies of manufactured goods of many kinds from Europe, and affording enterprising Canadian manufacturers an opportunity of entering new lines of business. Canada is now the second largest manufacturing country in the British Empire, thanks largely to cheap electric power, and her exports to the other Dominions as well as to the United States consist largely of manufactured goods.

Manufactures using home raw materials include flour milling, sugar refineries, fruit packing, meat packing, tanning, pulp milling, paper making, metal working, and easily form the bulk.

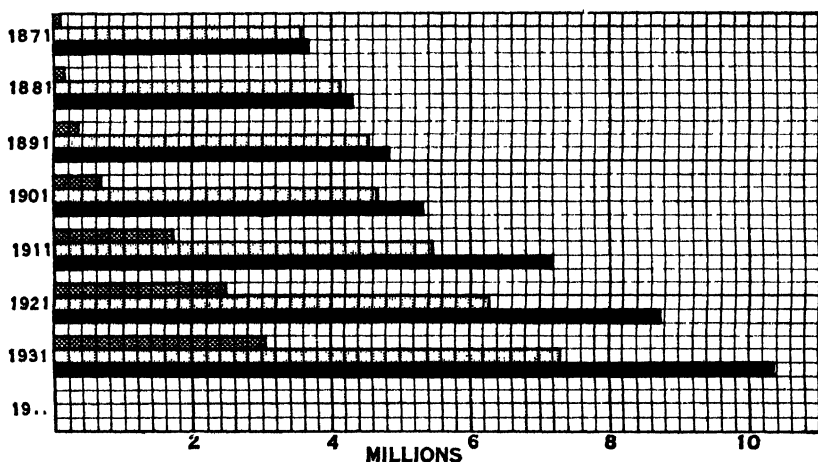


FIG. 218.—Graphs showing the growth in the population of Canada.

In black the total population; lightly dotted, the population of Eastern Canada; heavy dots, the population of the Prairie Provinces and British Columbia. The rapid growth of the latter is particularly noteworthy.

Manufactures using imported raw materials include the making of rubber goods, cotton and woollen fabrics and clothing, and iron and steel goods.

Water Power.—Canada has coal under the Prairie Provinces and in the Maritime Provinces but not near the main manufacturing area. There great use is made of hydro-electric power. Some of the chief power stations are shown in Fig. 218A.

Population.—Of the total population of rather over 10,000,000, the largest proportion still live in the St. Lawrence Lowlands of Ontario and Quebec (6,300,000), and rather over 2,000,000 in the Maritime Provinces. Growth of population is easily greatest in the Prairie Provinces. About 55 per cent. of the population is of British origin; over 2½ million, or 28 per cent., is of French descent.

Descendants of most European nations are represented, notably Germans, Austrians, and Scandinavians. Asiatics, though less than 1 per cent., are increasing.

A population map of Canada is interesting in showing the way

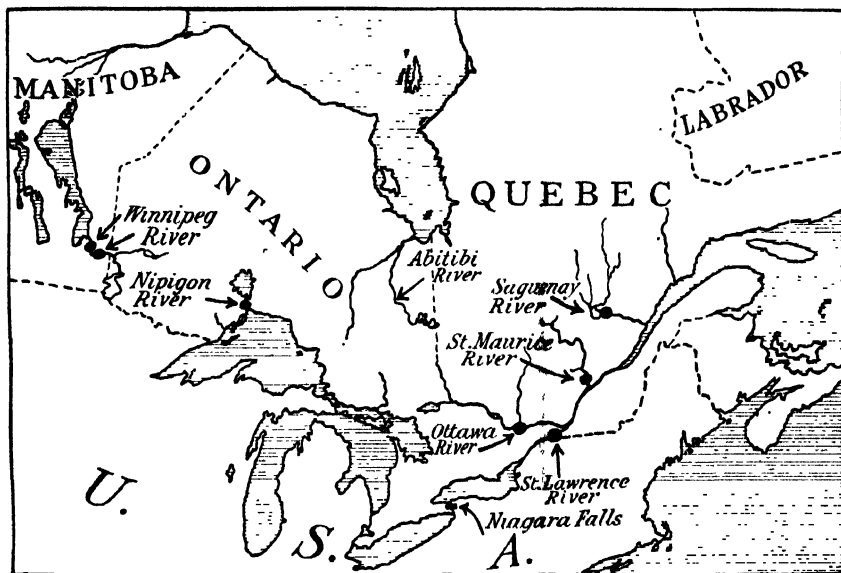


FIG. 218A.—Eastern Canada—showing principal hydro-electric power stations.

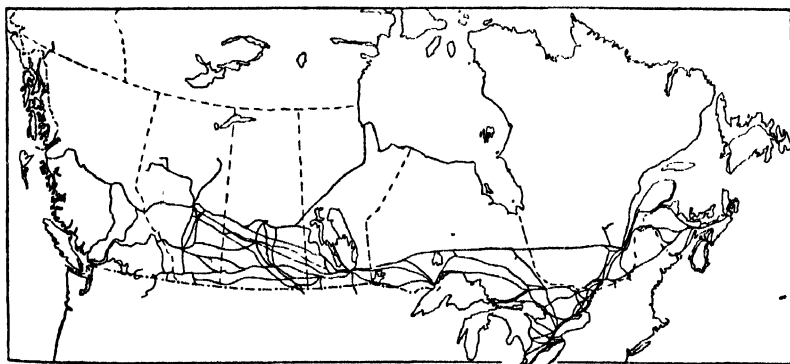


FIG. 219.—The railways of Canada—showing the development of the network in Eastern Canada and the Prairies.

in which the old eastern settlements are separated from the newer Prairie lands by the Great Lakes, and the Prairies from British Columbia by the Rocky Mountains.

GROWTH IN TOTAL POPULATION			
1871	3,689,257	1901. . . .	5,371,315
1881	4,324,810	1911	7,206,643
1891	4,833,239	1921	8,788,483
1931	10,374,196		

Communications.—Reference has already been made to the importance of the Great Lakes and the St. Lawrence waterways.

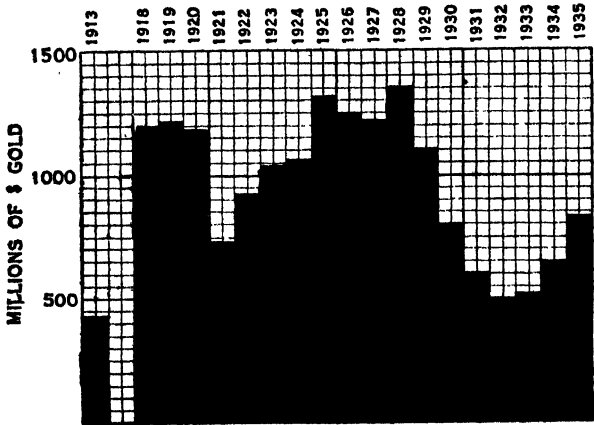


FIG. 220.—The exports of Canada (Canadian produce).

Each year is for the year ending on the following 31st March (e.g. 1913=1913-14. 1931 and onwards are calendar years, expressed in Canadian dollars.

But the great pioneer of settlement has been, and still is, the railway. Some details will be given later in connection with the Prairie

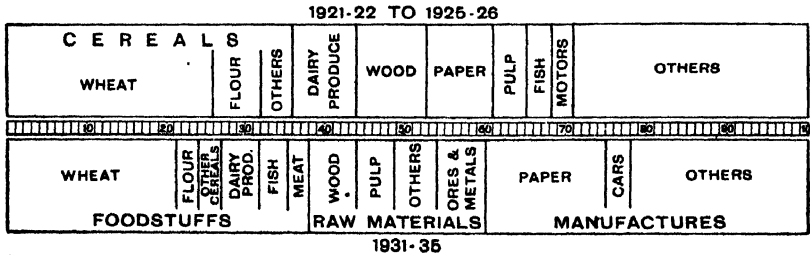


FIG. 221.—The exports of Canada.

In addition to the items enumerated, furs, silver, and copper are each over 1 per cent. ; nickel and asbestos nearly 1 per cent. each. The proportions shown here remain substantially correct ; many of the remaining exports are now manufactured goods.

Provinces. Care should be taken to follow the course of the Canadian Pacific Railway, noting the varying character of the regions through

which it passes. The Canadian National Railways include *inter alia* the Canadian Northern and Grand Trunk Pacific, which were left to follow less favourable routes from the point of view of trade, but whose importance as pioneers in the more northerly settlements the future will doubtless fully prove. The motor car has become

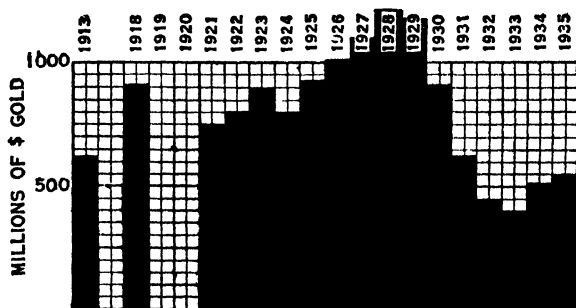


FIG. 222. The imports of Canada (imports for home consumption).

The imports during the world boom of 1919 and 1920 were too large to show on this diagram. Note year "1913"—year ending 31st March, 1914, etc. 1931 and onwards are calendar years, and are shown in Canadian dollars.

of very great importance in Canadian life, though no motor road yet crosses the Canadian Rockies.

Ports.—If the importance of a port is to be judged by the tonnage of sea-going vessels entered and cleared, Vancouver now holds pride of place, followed closely by Montreal and Halifax, and, at a much greater distance, by Quebec, Saint John, Sydney (N.S.) and New Westminster. Victoria has been included under Van-

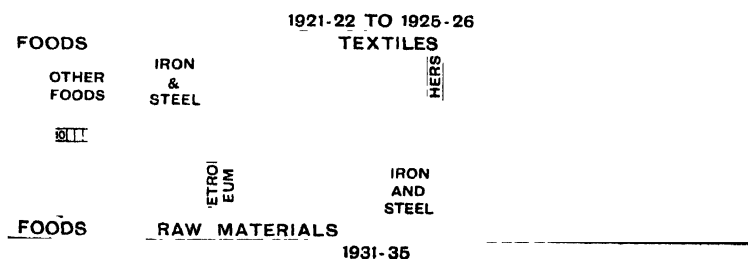


FIG. 223.—The imports of Canada.

couver, since Victoria is really the passenger out-port of Vancouver.

Foreign Trade.—Fig. 220 shows the increase in value in recent years of the exports of Canada; the increase is real, though figures of quantity are not available. The principal items in the export trade are shown in Fig. 221.

Fig. 222 shows the increase in value of the imports, and Fig. 223 illustrates their character.

The direction of foreign trade is illustrated in Fig. 224. Among the countries to which Canadian produce is sent, the predominating importance, and the relative equality, of the United States and the United Kingdom are particularly noteworthy. But there is a marked contrast with the countries from which imports are received, the United States occupying easily the first position.

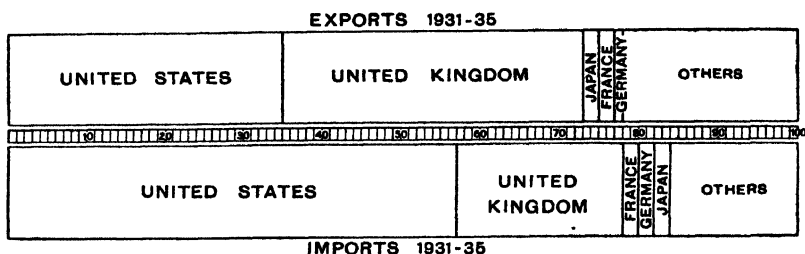


FIG. 224.—The direction of Canadian foreign trade.

THE NATURAL REGIONS OF CANADA

The Maritime Provinces.—The three small provinces of Eastern Canada—Nova Scotia, Prince Edward Island and New Brunswick—are usually known as the Maritime Provinces. They form a distinct natural region which is a natural continuation of that portion of the Appalachian Province lying in the New England States. Geographically a small portion of the Province of Quebec, lying to the south of the St. Lawrence and east of Quebec belongs to the same natural region, and the “Canadian Appalachian Region” is a convenient name for the whole. The old folded rocks and the hill ranges which they form have a general south-west north-east trend. Important coalfields occur, as shown in Fig. 225, the principal workings being in the neighbourhood of Sydney, on Cape Breton Island. There are three areas less rugged than the remainder and consisting of Carboniferous and Triassic rocks. These three areas are the long narrow Annapolis and Cornwallis Valleys of Nova Scotia; Prince Edward Island; and the northern part of New Brunswick. These are the areas of densest population and the principal agricultural lands.

Prince Edward Island has a fine red fertile soil and a climate¹ suitable for north temperate fruits and cereals. There is also much dairy farming and stock breeding. The breeding of foxes for furs is a recent activity increasing rapidly in importance. Fishing is important along the coasts.

The Sydney coal field is admirably situated for supplying coal

¹ Note the essential features of the climate of the maritime Provinces and New England—a moderate rainfall of between 20 and 50 inches remarkably well distributed through the year, colder winters than in England but warmer summers, and a sunny late summer favouring the ripening of fruit.

to Quebec, Montreal, and other St. Lawrence ports. Mining is continued during the winter and great stocks of coal await the opening of the navigation season in spring. More than half the Sydney output is, however, used in the manufacture of iron and steel, the iron ore being obtained from Bell Isle, Newfoundland.

The Maritime Provinces have the two great winter ports of Canada—Halifax and Saint John—both with deep-water harbours nearer to Liverpool than any of the United States ports or St.

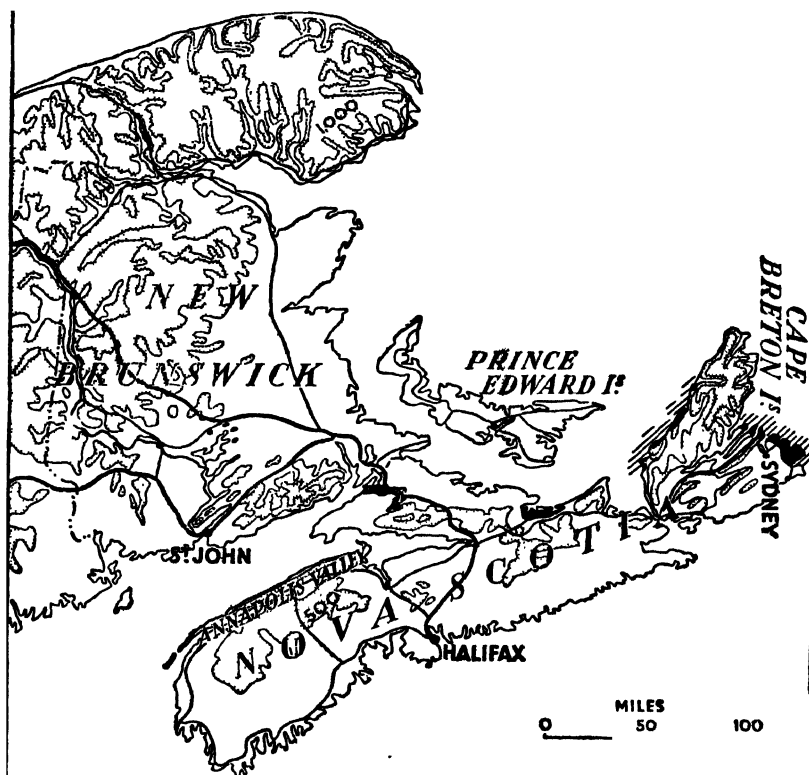


FIG. 225.—The Maritime Provinces of Canada.

Land over 500 feet dotted. The coalfields are shown in black, the lined areas representing extensions under the sea.

Lawrence ports. Halifax has the further advantage of lying almost on the Great Circle route from New York to Liverpool.

The St. Lawrence Lowlands.—This region comprises really three separate tracts :

(a) A strip of the provinces of Quebec and Ontario lying between Quebec and Ottawa on either side of the St. Lawrence, consisting of drift-covered plains through which rise the great

mass of the Adirondacks and a few small hill stumps of ancient formation.

(b) An area of sedimentary rocks between the Laurentian Shield and Lake Ontario.

(c) The Ontario Peninsula, between Lake Huron and Lake Erie, and bounded on the north by the Niagara escarpment.

Excellent soils are the rule throughout; the climate becomes milder as one goes south-westwards, with the result that oats and barley may be regarded as the typical cereals in Quebec, fall wheat and a little spring wheat in the Ontario peninsula. Cool temperate fruits—apples, pears, and plums—flourish throughout, but it is

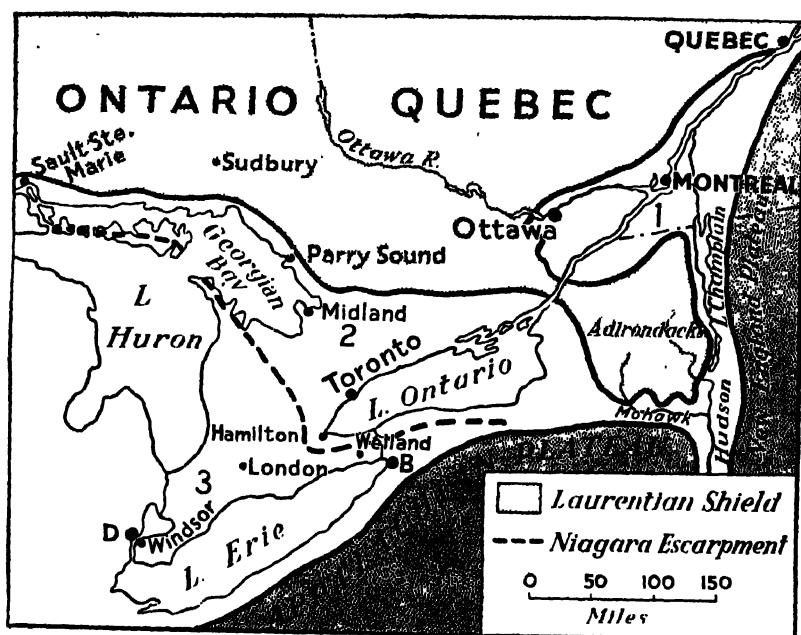


FIG. 226.—The St. Lawrence Lowlands.

only in the south, near the shores of Lake Erie and Lake Ontario, that the vine and such Mediterranean fruits as apricots and peaches flourish. Dairying and mixed farming is important throughout. The region is the most thickly populated part of Canada as well as the seat of agricultural development in the eighteenth and nineteenth centuries, and now the great manufacturing region.

Quebec (129,103 in 1931) remains the centre of French-speaking Canada and, although it has lost some of its importance as an ocean port since the deepening of the St. Lawrence to Montreal, has benefited of recent years by the bridging of the river a little above the city.

Montreal, the largest city and leading grain port of Canada, is the effective head of ocean navigation on the St. Lawrence and the natural meeting-place of routes from Ottawa on the one hand, and New York on the other. Of the two schemes to connect the St. Lawrence with the Great Lakes by ship canal, that of the Georgian Bay Canal *via* Ottawa to Georgian Bay has been virtually abandoned; the canalization of the St. Lawrence itself from Montreal to Lake Ontario is of necessity the concern of both the riparian nations, the United States and Canada, and awaits a financial scheme approved by both. Montreal (1,350,000) has developed general manufactures.

Ottawa (124,988 in 1931), the capital of Canada, lies on the fringe of the lowlands and of the best forest country in eastern Canada.

Toronto (627,582 in 1931), on Lake Ontario, has become the collecting and distributing centre of the whole of Southern Ontario.

All towns on the St. Lawrence Lowlands benefit from the plentiful supply of cheap hydro-electric power from the rivers of the Laurentian Shield on the one hand, and from Niagara Falls (nearly half a million horse-power) on the other.

Hamilton (154,914 in 1931), *Sault Ste. Marie* and *Port Colborne* have blast furnaces, using Pennsylvanian coal and Lake Superior (United States) iron ore, and supply pig iron for the steel works at Sault Ste. Marie, Toronto, Hamilton and Welland. Windsor shares in the automobile industry of Detroit. *London* (71,022 in 1931) is another important centre.

The Laurentian Shield.—This huge area has already been described in part in connection with its mineral resources and its forests. Apart from the mining population of such towns as Sudbury, but a very small number of the people of Canada actually live on the Shield, though its forests and its water power supply wealth to the neighbouring towns of the St. Lawrence Lowlands.

At present much interest centres on the agricultural possibilities of the "Clay Belt" along the line of the Canadian National Railway for the growth of potatoes, vegetables, and the hardier cereals. Northwards the Canadian Shield becomes increasingly bare and barren, and the only really useful suggestion for the development of the tundra is associated with the name of Stefansson, who sees great possibilities in the breeding of caribou, musk-ox and reindeer.

The Prairie Provinces.—The Prairie Provinces (Manitoba, Saskatchewan and Alberta) comprise essentially the northern portion of the great triangle of treeless grassland which lies in the centre of the North American continent, and a belt of "grove" country to the north which passes gradually into the great stretch of northern coniferous forest. The Laurentian Shield occupies the north-east of Manitoba and Saskatchewan, whilst Alberta includes a strip of the Rocky Mountains. The economic importance of the

Prairie Provinces centres on the agricultural development of the Prairies, which is steadily being pushed northwards into the grove belt. It is this area, the Prairies themselves, we shall now consider. The three prairie "steps" have already been briefly described.

(a) The first Prairie Step, once the bed of the glacial Lake Agassiz, has a rich, black soil and is now devoted largely to mixed farming. Although the richly nitrogenous soil is a surface layer, it is underlain by a great thickness of marly alluvium which is itself a soil of first quality, and the fertility of the ground may therefore be considered almost inexhaustible.

(b) The second Prairie Step has the undulating surface usually considered so typical of the Prairies. The escarpments separating

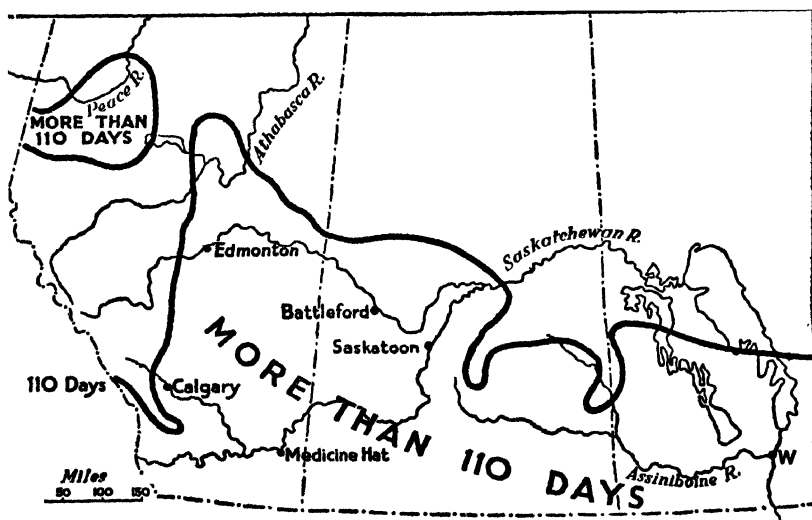


FIG. 227.—The growing season in the Prairies.

Attempts are now being made to breed wheats which will ripen with a growing season of less than 110 days.

the prairie steps are due to the outcrops of certain more resistant members among the series of nearly horizontal beds underlying the Prairies (see Fig. 213). The escarpment of the second step thus rises 500 to 1000 feet above the level plain to the east. The second prairie step is devoted mainly to wheat farming.

(c) The third Prairie Step has a surface much more irregular in character than that of the first or second. The rivers often flow through deep gorge-like valleys; flat-topped hills, such as the Cypress Hills, break the monotony of the surface.

Climatically the whole of the Prairie Provinces lies within the isotherm of 32° for three months of winter. The winters are long and hard, though sunny and healthy. In summer it is the length

of the growing season which is of prime importance. The older varieties of wheat, such as Red Fife, demanded a growing season of at least 125 days; the now widely grown variety, Marquis, demands less, and it is hoped that such varieties as Ruby and Prelude may ripen in areas having a growing period of 100 days and even less. The northward extension of wheat cultivation depends upon the success of such varieties. Fig. 227 shows the area lying within the line of 110 days with a mean daily temperature of 10°C . (50°F). The milder winters of Western Alberta are due to the prevalence of the warm Chinook winds blowing down from the mountains, and the pastures of the ranching lands may be open for limited periods

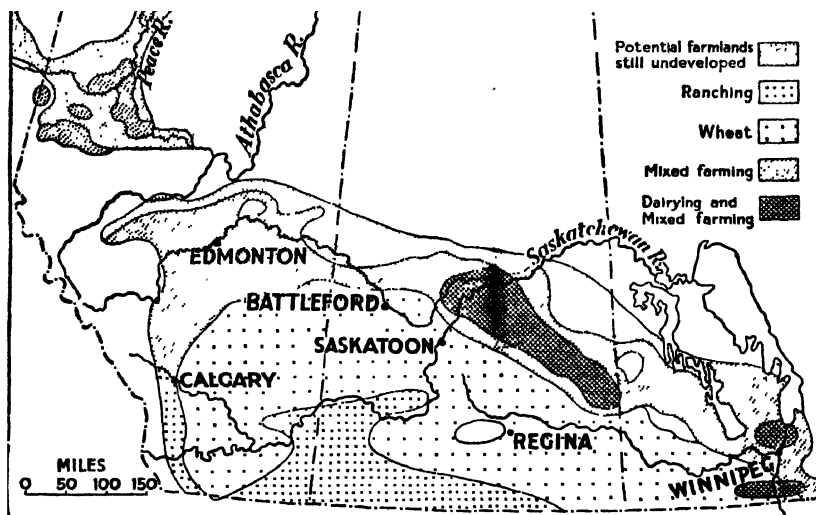


FIG. 228.—The types of farming in the Prairies.

even in the heart of the winter. In general the rainfall of the Prairies is adequate for cereal growth except in the south-west, where the average drops to less than 12 inches. The accidence of the rain in the spring and summer months renders available the major proportion of the annual total.

Fig. 228 shows the principal types of farming carried on in the Prairies and illustrates the wider northward range of oats and barley when compared with wheat. The Prairies, it need scarcely be emphasized, form one of the greatest granaries in the world. In 1934-35 the Prairie Provinces, with only 2,500,000 people, sowed annually over 23,000,000 acres of wheat, producing over 250,000,000 bushels (in some previous years over 400,000,000 bushels).

The development of the Prairies is a subject of special interest. The railway was the pioneer; settlement followed and resulted

obviously in an increase of cropped area and livestock. This is illustrated by the following figures for the three Prairie Provinces :

RAILWAY MILEAGE

1900	3,716
1910	7,641
1929	17,600 (steam)
19..	

POPULATION

1901	419,512
1911	1,328,121
1921	1,956,082
1931	2,213,500
19..	

CROPPED AREA

1900	4,000,000 acres approximately
1910	14,000,000 " "
1920	30,000,000 " "
1931	42,220,000 " "
19..	

LIVE STOCK

	Horses	Cattle	Sheep	Swine	Poultry
1901	339,989	941,625	189,665	200,281	1,717,019
1911	1,194,995	1,808,931	285,130	712,222	8,432,423
1925	2,379,730	3,746,885	470,160	1,764,382	18,187,960
1930	2,130,400	3,240,000	963,300	1,406,000	22,791,100

Towns naturally sprang up as collecting and distributing centres, railway junctions and administrative headquarters. The amazing growth of certain Prairie towns is shown by the following figures :

	1901	1911	1921	1931
Winnipeg	42,340	136,035	179,087	217,587
Edmonton	4,176	31,064	58,821	78,829
Calgary	4,392	43,704	63,305	83,362
Regina	2,249	30,213	34,432	53,034
Saskatoon	113	12,004	25,739	43,025

Fifty years ago Winnipeg itself had less than a thousand people. The rivers of the Prairies are of little use as highways. Nearly all the produce is sent out of the region by rail and distributed as shown in Fig. 217. The importance of the Great Lakes traffic should be noted. The grain is taken to the rail by carts or motors and loaded into grain elevators where it may be dried, sorted, and stored until the most propitious season for shipment by rail. Of recent years Vancouver has been leaping into prominence as an outlet port for prairie grain—some of which eventually finds its way to Europe *via* the Panama Canal. The Prairie Provinces now have their own outlet in Churchill on Hudson Bay, the railway to which was completed in 1929, and grain shipped to Britain in 1931.

Reference must be made to the important irrigation works, utilising the waters of the Bow River, St. Mary River, and Belly River, which are in operation in the dry region of South-west

Alberta. Much of the irrigation work is due to the initiative of the Canadian Pacific Railway. Alfalfa is an important crop on the irrigated land.

The Western Cordillera and the Pacific Coast.—The Rocky Mountain System of Canada lies mainly in the Province of British Columbia, all the northern part constituting the Territory of Yukon. The whole region is mountainous and very different in all respects from the remainder of Canada. The coast is a typical fiord coast, fringed by numerous mountainous islands of which the largest is Vancouver Island, nearly equal in size to Scotland. The mountainous backbone of Vancouver Island is physically a continuation of the Coast Range of the United States. On the mainland of British Columbia, near the coast, lies the lofty Coast Range of Canada, a continuation of the Cascade Range of the United States. Behind the Coast Range comes a series of dry plateaus, then the Selkirk Range separated by a deep trough-like valley from the Rocky Mountains themselves. In the north is the Yukon Plateau, drained by the Yukon River and situated partly in Canada, partly in Alaska. The provincial boundary between British Columbia and Alberta follows the main Rocky Mountain divide, thus geographically the region under consideration includes a narrow strip of Alberta—a narrow strip in which are situated the beautiful mountain resorts of Banff and Mount Louise.

The region is under the influence of the westerly winds. There is a marked winter rainfall-maximum, but the exposed mountain chains are very wet, whilst sheltered valleys and plateaus in rain-shadow areas may be very dry—the rainfall being in some areas less than 5 inches per year. The influence of the North Pacific Drift is seen in the mildness of the climate of the coastal strip—in this respect resembling the west coast of the British Isles or Norway, which are influenced by the North Atlantic Drift. A description has already been given of the forests which clothe the mountains and render British Columbia the leading lumber province. Mention has also been made of the copper, silver, lead, zinc, and gold mining of British Columbia and the gold mining of the Yukon; and the very important fisheries. The salmon of the Fraser and other rivers are netted in enormous numbers either in the rivers or the sea, advantage being taken of the fact that the salmon lives part of its life in the sea, part in fresh water, migrating riverwards annually to spawn.

The warm, sheltered valleys of the southern part of British Columbia having almost a Mediterranean climate (note low rainfall, with maximum in the mild winter, and abundant summer sunshine) are famous for their fruit orchards—of apples, pears, cherries, and plums, with peaches and grapes in the warmest parts.

The railways of the region, which form the principal means of communication, are naturally compelled to take full advantage of

the often narrow and difficult valleys. The Canadian Pacific Railway from Vancouver goes up the Fraser River and then along its tributary the Thompson, and passes through the Kicking Horse Pass. The Canadian National Railways have two lines: one from Vancouver up the Fraser River, the other from Prince Rupert, both joining to cross the main chain by the Yellowhead Pass. A main motor road across the Rockies is now in course of completion.

Vancouver (245,307 in 1931) is the principal town in British Columbia and Canada's leading port in point of shipping tonnage entered and cleared. In addition to an important trans-Pacific trade to the Far East and Australia, there is a coasting trade to San Francisco and through the Panama Canal. *Victoria*, on Vancouver Island, guards the entrance to Vancouver as well as to the American port of Seattle. *New Westminster* almost joins Vancouver on the south, and is a fish-canning centre. *Prince Rupert*, the

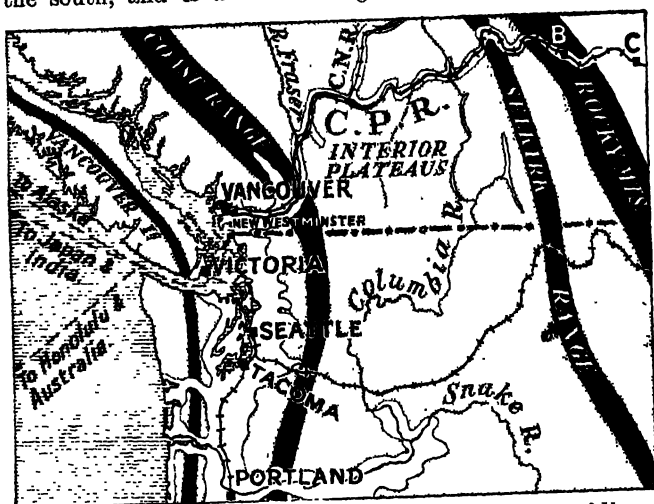


FIG. 229.—The southern part of British Columbia and the position of Vancouver and Seattle. Victoria, on Vancouver Island, controls the entry to both ports.

B = Banff; C = Calgary.

terminus of the Canadian National Railways, is a second centre of the fishing industry.

The Cold North.—It is not proposed to deal in any more detail with this region except to note the possibilities of oil in the lower basin of the Mackenzie River and of the grassy types of tundra (northern prairies) as grazing grounds.

NEWFOUNDLAND

Geographically a continuation of the Canadian Appalachian Region, the island of Newfoundland forms a separate Dominion of the British Empire, and has also under its jurisdiction a large area

of the coast of Labrador. The coast of Newfoundland is rugged and on the south-west the coast range reaches an elevation of nearly 2,000 feet. Eastwards there is a large spread of undulating country, consisting largely of barrens and marshes, with numerous lakes and rivers. On the borders of the lakes good land is often found and in some areas heavy timber. Although Newfoundland does not suffer from the fogs characteristic of the great fishing banks, its climate is too cold, especially in summer, for the proper growth of cereals and out of a total population of 282,000 (1931), 65,000 are fishermen and only 3,200 farmers. The principal crops are hay, potatoes, and turnips. Large saw mills, extensive paper and pulp mills have been erected at Grand Falls and elsewhere, whilst the iron deposits of Bell Isle supply the blast furnaces of Sydney, Nova Scotia. The capital is St. John's (42,143 in 1930).

THE UNITED STATES

Position and Size.—The great republic known as the United States of America was founded in 1776 when, on July 4, the Declaration of Independence of the thirteen States of which the American Union then consisted was adopted by Congress. Great Britain acknowledged the independence of the United States in 1782, and the treaty of peace was concluded the following year. The form of government in the United States is based on the Constitution of September 17, 1787, to which ten amendments were added in 1791, and nine subsequent amendments at intervals from 1798 to 1920. The executive power is vested in a President, who holds office for four years. The Union now comprises 48 States in all, each with its own Constitution, which must, however, be republican in form. The Governor of each State is chosen by direct vote of the people over the whole State. In the "Territories" of Hawaii and Alaska there is a Governor appointed for four years by the President. The District of Columbia, co-extensive with the city of Washington, is the seat of the United States Government.

The total area of the Continental United States is 3,026,789 square miles; of non-contiguous territory, including Alaska, 711,582 square miles, making a total of 3,738,371. Area of the continental United States given above includes water; gross area excluding water is 2,973,776 square miles. The figure for non-contiguous territory includes land and water. Total population given below includes soldiers, etc., abroad. Population of continental United States: 1910, 91,972,266; 1920, 105,710,620; 1930, 122,775,000. The following table of the areas and populations of the States is given for reference purposes:

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State	Area in square miles	Population		
		1910	1920	1930
Maine	29,895	742,371	768,014	797,423
New Hampshire	9,031	430,572	443,083	465,293
Vermont	9,124	355,956	352,428	359,611
Massachusetts	8,039	3,366,416	3,852,356	4,249,614
Rhode Island	1,067	542,610	604,397	687,497
Connecticut	4,820	1,114,756	1,380,631	1,606,903
New York	47,654	9,113,614	10,385,227	12,588,066
New Jersey	7,514	2,537,167	3,155,900	4,041,334
Pennsylvania	44,832	7,665,111	8,720,017	9,631,350
Ohio	40,740	4,767,121	5,759,394	6,646,697
Indiana	36,045	2,700,876	2,930,390	3,238,503
Illinois	56,043	5,638,591	6,485,280	7,630,654
Michigan	57,480	2,810,173	3,668,412	4,842,325
Wisconsin	55,256	2,333,860	2,632,067	2,939,006
Minnesota	80,858	2,075,708	2,387,125	2,563,953
Iowa	55,586	2,224,771	2,404,021	2,470,939
Missouri	68,727	3,293,335	3,404,055	3,629,367
North Dakota	70,183	577,056	646,872	680,845
South Dakota	76,868	583,888	636,547	692,849
Nebraska	76,808	1,192,214	1,296,372	1,377,963
Kansas	81,774	1,690,949	1,760,257	1,880,999
Delaware	1,965	202,322	223,003	238,380
Maryland	9,941	1,295,346	1,449,661	1,631,526
District of Columbia	62	331,069	437,571	486,869
Virginia	40,262	2,061,612	2,309,187	2,421,851
West Virginia	24,022	1,221,110	1,463,701	1,729,205
North Carolina	48,740	2,206,287	2,559,123	3,170,276
South Carolina	30,495	1,515,400	1,683,724	1,738,765
Georgia	58,725	2,609,121	2,895,832	2,908,506
Florida	54,861	752,619	968,470	1,468,211
Kentucky	40,181	2,289,905	2,416,630	2,614,589
Tennessee	41,687	2,184,789	2,337,885	2,616,556
Alabama	51,279	2,138,093	2,348,174	2,646,248
Mississippi	46,362	1,797,114	1,790,618	2,009,821
Arkansas	52,525	1,574,449	1,752,204	1,854,482
Louisiana	45,409	1,656,388	1,798,509	2,101,593
Oklahoma	69,414	1,657,155	2,028,283	2,396,040
Texas	262,398	3,896,542	4,663,228	5,824,715
Montana	146,131	376,053	548,889	537,606
Idaho	83,354	325,594	431,866	445,032
Wyoming	97,548	145,965	194,402	225,565
Colorado	103,658	799,024	939,629	1,035,791
New Mexico	122,503	327,301	360,350	423,317
Arizona	113,810	204,354	334,162	435,573
Utah	82,184	373,351	449,396	507,847
Nevada	109,821	81,875	77,407	91,558
Washington	66,836	1,141,990	1,356,621	1,563,396
Oregon	95,607	672,765	783,389	953,786
California	155,652	2,377,549	3,426,861	5,677,251
Alaska	586,400	64,356	55,036	59,278
Hawaii	6,406	191,909	255,912	368,336
Porto Rico	3,435	1,118,012	1,299,809	1,543,913
Philippine Islands	114,400	7,635,426	10,314,310	12,082,366
American Virgin Islands	133	27,086	26,051	22,012
Samoa	75	7,251	8,056	10,055
Guam	206	11,806	13,275	18,509
Panama Canal Zone	527	62,810	22,858	39,467
3,738,371		101,146,530	117,823,165	137,008,435

Whilst the total area of the United States is thus roughly equal to that of the Dominion of Canada, and the area of the continental States roughly equal to that of Australia, the States are far more favourably situated than either Canada or Australia and have a much larger proportion of cultivable land and are capable of supporting a far larger population. Lying wholly within the North Temperate Zone (excluding non-contiguous territory) and avoiding both the frozen deserts of the North, and the difficult regions of the hot wet forests of the equator, the situation of the United States is almost ideal. Only the natural products of equatorial climes—of which rubber is the most important—cannot be produced at home.

Physical Features.—We are now familiar with the threefold division of the North American continent, represented in the United

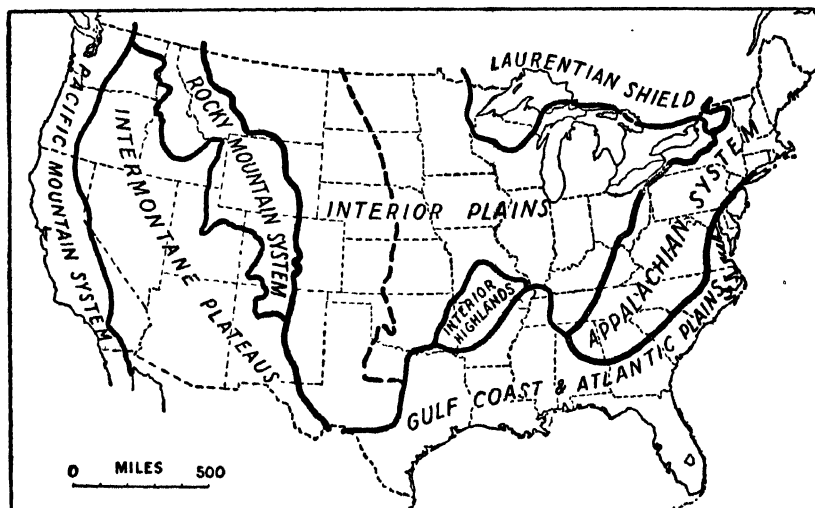


FIG. 230.—Major physiographic regions of the United States. (After Rodwell Jones.)

States by the Appalachian System in the east, the Rocky Mountain or Cordilleran System on the west, and the intervening central plains. It is necessary to consider these three divisions in the United States and to show that they may be divided into the *major physiographic regions* shown in Fig. 230, each of which is, again, capable of sub-division.

The Appalachian System occupies a large and very important area in the north-east. The fold-mountains have a predominantly south-west to north-east trend, that is roughly parallel to the Atlantic Coast. This alignment resulted in the mountains long acting as barriers against the spread of the early settlers in the New England States and has an important influence on communications even at the present day.

The Central Plains comprise several subdivisions :

(a) A fragment of the Laurentian Shield lies south and west of Lake Superior and is economically important as including the great iron-mining areas of the United States.

(b) The Interior Plains correspond roughly with the interior grasslands, and may be divided into the Great Plains or Short Grass region on the west and the Central Lowland or Tall Grass region on the east.

(c) The Interior Highlands, comprising the Ozark and Ouachita Mountains rise like a large double island of old rocks, rich in minerals, from the Central Plains.

(d) The Atlantic and Gulf Coast Plains border the Gulf of Mexico and swing round the southern end of the Appalachian System to border the Atlantic.

The Western Mountain System comprises at least three subdivisions :

(a) The Rocky Mountain System, properly speaking ; that is the Rocky Mountains and associated ranges. In the United States the system is separated into a northern and a southern half by the Wyoming Basin.

(b) The Intermontane Plateaus, including the Columbia Plateaus, the Colorado Plateaus and the Great Basin.

(c) The Pacific Mountain System, comprising the Cascade—Sierra Nevada and the Coast Ranges with the intervening valleys.

Geology.—The outstanding geological units of the United States may be correlated very closely with the physiographic units.

The Appalachian System is a great folded geosyncline, with ridges of ancient rock exposed especially in the north and along the east (New England Province and Piedmont Province) ; old sedimentary rocks, mainly of Palæozoic age and including large tracts of rich coal measures, occupy most of the remainder. The Appalachian System thus includes mineralized areas in which metalliferous ores are important, and huge basins of sedimentary rock, including highly important coalfields (Pennsylvania, Pennsylvania anthracite, etc.).

The Central Plains.—With the exception of the fragment of the Laurentian Shield in the north-east and the Ozark-Ouachita Highlands, the Central Plains consist of sedimentary rocks but slightly folded. The rocks, however, vary greatly in age. Underlying the Central Lowland or Tall Grass region and the country south of the Great Lakes, older rocks are present and include large coal basins but slightly folded, and some important oil fields, especially in the south-west (Mid-Continent Fields). Underlying the Great Plains (Short Grass region) are younger rocks, often with large reserves of

sub-bituminous or lignitic coal and some oil pools. The Gulf Coast and Atlantic Plains are also built up of younger sedimentary

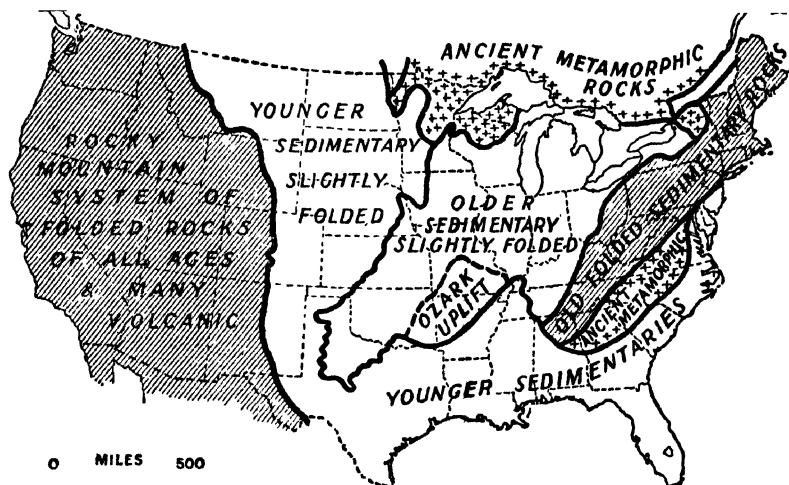


FIG. 231.—Outline geological map of the United States.

rocks, including stretches of recent alluvium around the mouth of the Mississippi and along parts of the coastal tracts.

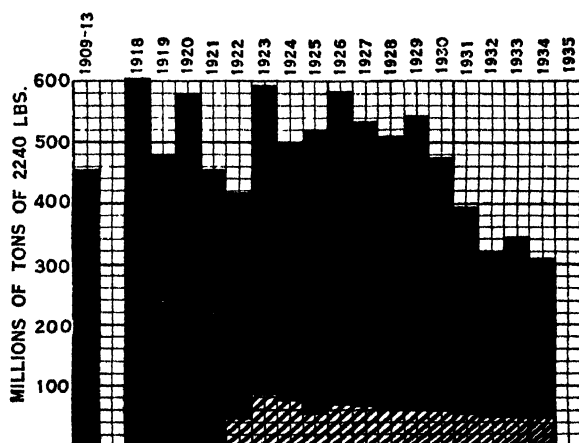


FIG. 232.—The coal production of the United States (bituminous coal and anthracite). For the years 1922 onwards the proportion of anthracite is shown by the lined area at the foot of each column. In keeping this graph up to date (e.g. from the *Statesman's Year Book*) care should be taken to convert short tons of 2,000 lbs. to long tons where necessary.

The Western Mountain System consists of a highly folded complex with numerous intrusive masses of granite and other plutonic rocks,

and covered in some areas, such as in the Snake River Plateau and portions of Yellowstone Park, by huge spreads of lava. Many areas, as we found was the case in British Columbia, are highly mineralized. On the flanks of the Mountain system are the huge oil pools of California.

Minerals.—The value of the annual output of minerals from the United States is immense; in 1929 it was estimated at \$5,878,000,000.¹ Coal and oil vie for first place in point of value; the former being the more important if anthracite is included. Iron, natural gas, cement, and copper followed in that order in 1930.

Coal.—The United States now produces roughly 40 per cent. of the world's coal. The distribution and output of the fields has been discussed in Part I (see pp. 197–201 and Fig. 161) and will not be repeated here. Fig. 232 has been drawn to show the rise in production in recent years. The high quality and the great quantity of coal in the United States, combined with the relative ease with

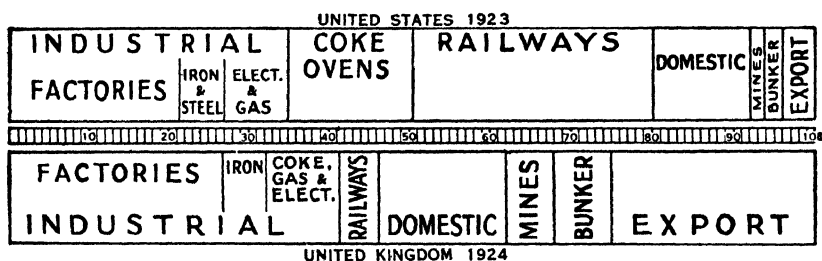


FIG. 233.—The uses to which the coal of the United States is placed, contrasted with the United Kingdom.

Notice particularly railways and export.

which it is mined and the situation of the best coal in the east, have been the main factors in determining the rise of the country to her present leading position amongst industrial nations. Roughly a third of the coal produced is devoted to industrial uses, in addition to 13 per cent. used in the production of coke—largely for iron-smelting purposes. A quarter of the whole is consumed by the railroads.

Petroleum.—Oil in the United States has also been discussed in Part I (pp. 208–210, Fig. 169). In the early days of the industry, from 1859 to 1875, Pennsylvania was practically the only producing State, and petroleum found its chief use as an illuminant before the coming of electricity. Very broadly speaking the oils of the eastern States are *light*, and yield large quantities of gasoline or petrol and kerosene; the oils of the western States are, on the whole, heavier, and a considerable proportion is used in a crude state as fuel oil. The United States controls much of the production of Mexico and South America, with the result that petroleum and petroleum products figure amongst the leading exports. The huge production

¹ 1934—\$3,335,000,000.

of petroleum in the United States has resulted in the development of specialized means of transport. Pipe-lines, through which the oil is pumped by means of powerful pumps placed at intervals of 15 to 30 miles, connect the mid-continent and eastern fields with the lakeside industrial regions and the Atlantic coast. The Californian output is handled largely by "oil tankers," and petroleum ranks first in quantity and value of the commodities passing through the Panama Canal.

Natural gas occurs both in the oil territory and also by itself. The largest source is the northern portion of the Appalachian oil field. Enormous quantities have been allowed to escape and to be completely wasted; the value of that portion which is utilized is said to be greater than the value of the gold and silver production

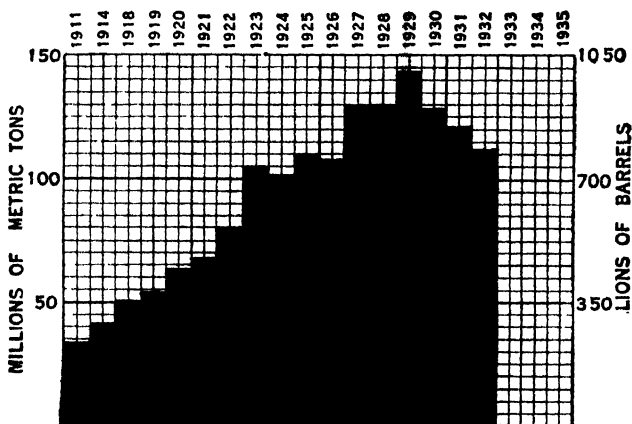


FIG. 234.—The production of crude oil in the United States.

(Note: production for 1933 was 906 million barrels; 1934, 909.)

The very rapid rise, followed by a period of slight increase, should be noted.

combined. Much of the gas is used in industrial plants and for domestic purposes in the area of production, large quantities are piped to the Erie lakeside towns.

Iron Ore.—Of all the industries of the United States, the production of iron and steel is the most important, if the amount of capital sunk in the industry be taken as a criterion. The distribution and production of the ore has been discussed in Part I (see pp. 222-3 and Fig. 176). As explained there, the greatest iron mines, in Minnesota, are a thousand miles from the region where the best coking coals are produced (Pennsylvania). But the seriousness of this distance is minimized by the presence of the Great Lakes. Nearly all the iron ore moves eastward towards the fuel, not only because the early use of local iron ore caused the smelting works to be established there, but because the markets for the products

are mainly in the north-east. The Pittsburgh area is still the leading steel-producing region, followed by the Michigan and Erie lakeside towns and by the Birmingham area.

Copper.—The ores of the metallic minerals are, as one would expect, found mainly in four tracts—the mineralized zones in the heart of the Cordilleran Chains (Intermontane plateaus); the Ozark-Ouachita Highlands; the tracts of old rocks in the Appalachian Mountain region; and that portion of the Laurentian Shield lying south of the Canadian border. The United States is the leading producer of copper, with about 60 per cent. of the world's output. With the exception of important deposits in the Laurentian rocks of Michigan, it is nearly all obtained in the Cordilleran states—

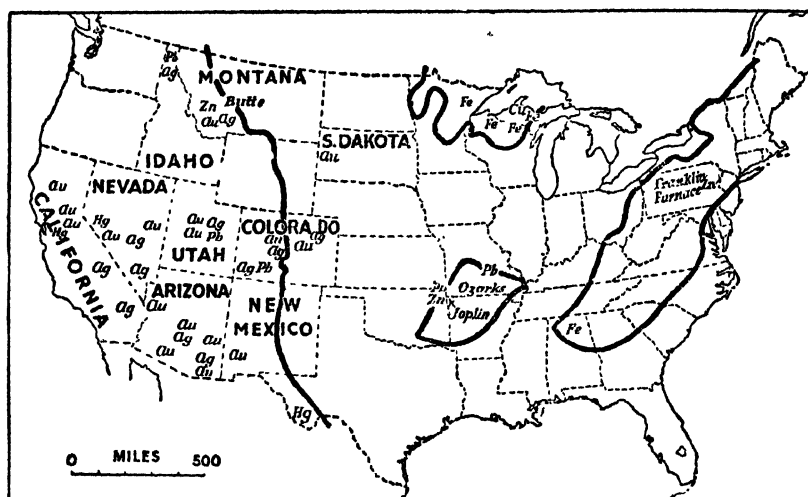


FIG. 235.—The metalliferous minerals of the United States.

The significance of the lines is indicated on Fig. 231. Fe=Iron; Au=Gold; Ag=Silver; Cu=Copper; Zn=Zinc; Pb=Lead; Hg=Mercury.

especially in Arizona, the Butte district of Montana, the Bingham district of Utah, Nevada, California, New Mexico, and Alaska. There is a large export trade in copper.

Gold.—The United States ranks third, after South Africa and Canada, in the production of gold, but the output, once over \$100,000,000 a year (1915), has dropped considerably of recent years. Nearly all the gold is obtained from the Cordilleran states, the leading producers being California, Alaska, South Dakota (Black Hills), Colorado, Utah, Nevada, and Arizona (order of importance in 1932).

Silver.—Three-quarters of the world's silver comes from the continent of North America, Mexico, United States, and Canada sharing in the production. In the United States, it is again almost entirely from the western states—Utah, Idaho, Montana, New

Mexico, Arizona, Colorado, and Nevada. The ores in Mexico are essentially silver ores, but the United States ores are mainly silver-lead ores (as in Idaho) or silver-copper ores (as in Montana).

Lead.—The United States leads the world in the production of lead. The Ozark Highlands include the principal mines (Joplin district and south-east Missouri); the remainder of the production is from the western states, especially from the silver lead deposits of Cœur d'Alene in Idaho, the Butte district of Montana, Utah, and Colorado.

Zinc.—The United States also leads in the production of zinc—about 45 per cent. of the world's total. There are three main producing areas. The Joplin district—lying partly in Oklahoma, partly in Kansas and partly in Missouri—is responsible for one-half of the whole. Second place is taken by Franklin Furnace (New Jersey), and third place by Butte in Montana.

Aluminium.—The United States again leads in world production and 80 per cent. of the bauxite (the principal aluminium ore utilized in the extraction of the metal) mined is obtained in Arkansas.

Other metals produced in the United States include platinum, antimony, and mercury.

Of metals in which the United States is deficient the most important one is *tin*. Others are nickel, chromium, and manganese.

Clay and Clay Products rank high among the non-metallic minerals of economic importance and are worth three to four times as much as the annual production of gold. They are most important in the thickly populated eastern states, notably in Ohio. Where possible, bricks, tiles, and coarse pottery are made near the chief centres of production—thus New York is supplied by brickyards along the Hudson.

Portland Cement has increased in importance tremendously in recent years with the growth of cement and steel buildings, and the widespread use of cement roads. It is made where suitable limestone and shale are found in close proximity, especially in regions of greatest building activity. The Lehigh district in eastern Pennsylvania is especially noteworthy.

Salt.—Some rock-salt is mined but the greater part of the salt is obtained by the evaporation of natural or artificial brine, especially in Michigan, New York, and Ohio. Sea water is used along the Californian coast, the waters of the Great Salt Lake in Utah.

Sulphur.—About four-fifths of the world's supply of sulphur is now obtained from two or three sources near the Gulf coast of Louisiana and Texas.

Stone.—The New England States have long been the principal source of granite and marble for building, though stone of various kinds is quarried in many regions.

Phosphates.—These are obtained in large quantities in Florida.

The Climates of the United States.—The broad climatic and vegetation regions have already been mentioned under North America. A slightly different classification and nomenclature, suggested by R. de C. Ward, is often used in the United States :

(1) Northern Pacific Province = Cool Temperate Oceanic Climate with abundant rainfall all the year from the westerlies, but with a winter maximum.

(2) Southern Pacific Province = Mediterranean Climate of California ; with winter rainfall from the westerlies.

(3) Plateau Provinces = Desert and Semi-Desert Climates of the Intermontane Plateaus.

(4) Plains Province = Temperate Continental Climate where

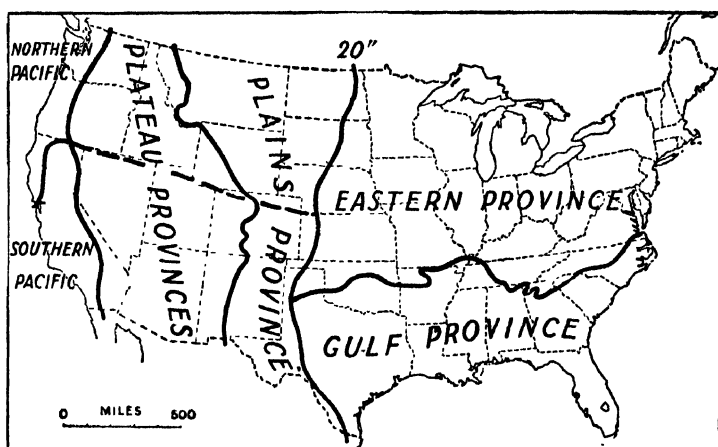


FIG. 230.—The climatic provinces of the United States. (After Ward.)

the rainfall is less than 20 inches, that is rather too little for agriculture.

(5) Gulf Province = Warm Temperate Oceanic Climate where snow is rare and the warming influence of breezes from the Gulf and North Atlantic are felt.

(6) Eastern Province = the region with the St. Lawrence type of climate and a strip of the Grassland region where the rainfall is more than 20 inches per year. The whole has a sufficient rainfall for agriculture, a marked difference of temperature between summer and winter, rapid changes of weather from day to day.

Natural Vegetation.¹—A broad general outline of the natural vegetation has already been given above (see p. 271 and Fig. 209). It is necessary to subdivide some of the broad divisions there shown,

¹ This section is based on the *Atlas of American Agriculture*, Part I, Section E, by H. L. Shantz and R. Zon, *U.S. Dept. of Agriculture*, 1924.

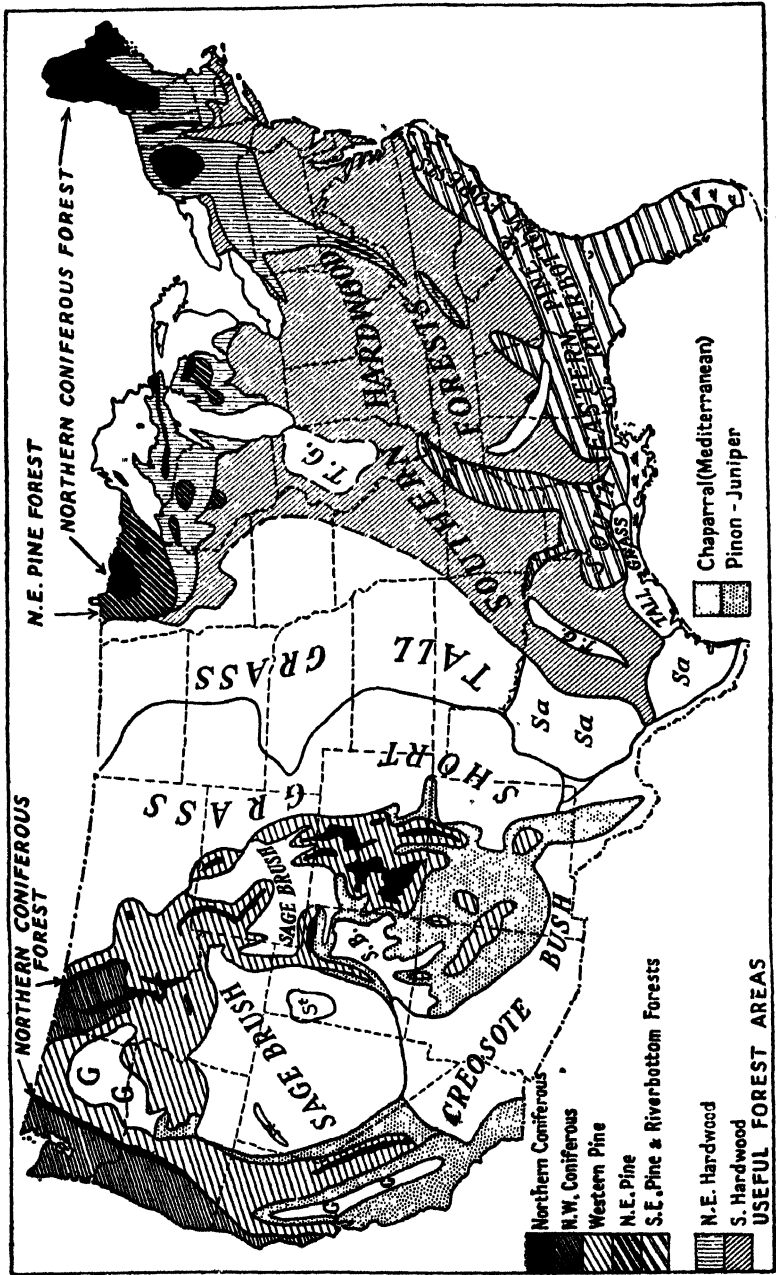


FIG. 238 — Vegetation map of the United States (adapted from the Atlas of American Agriculture).

(e-f) The south-eastern forests, covering the area shown as Warm Temperate Forest on Fig. 209, comprise two distinct types. The south-eastern pine forests of long-leaf pine and other pines are a valuable source of timber and occupy a broad belt along the Gulf Coast and Atlantic coastal plains. The river-bottom forests of cypress, red gum, tupelo, and oaks occupy the valleys in the same tract. The "sloughs" of the river-bottoms remain under water for much of the growing season; the "glades" are only subject to overflow for limited periods.

(g) A strip of mangrove forest occurs along the west coast of Florida.

The Western Forests comprise five main types :

(a) The northern coniferous forest of spruce and fir again extends south of the Canadian border and is found near the crest of the Cascades, Rockies, and other main ranges.

(b) The north-western coniferous forest comprises the great forest of Douglas fir on the Pacific slopes of the Cascades, the redwood forests of the coastal strip further south and the western white pine and larch region of Western Montana and Northern Idaho. Throughout the western region red cedar and hemlock tend to be the most important trees.

(c) The western pine forest of yellow pine and Douglas fir, with sugar pine and lodgepole pine, occupies large and important areas especially in the Columbia river basin.

(d) The south-western coniferous woodland of pines and juniper occupies large areas especially in the Great Basin. But the timber is all small and its chief use is for fence posts and fuel for local use.

(e) Chaparral, the typical Mediterranean vegetation, is a mixed forest of stunted oaks, cherry, and other trees which vary from place to place, and occupies the lower hills and mountains of California.

Grassland.—The two principal types of grassland are the tall grass of the true Prairies, and the short grass of the western prairies or "plains." More specialized types are the desert savana of Texas; the bunch grass of the Californian Valley and central part of the Columbia Basin, and the various patches of Alpine and marsh grass.

Desert.—Apart from the desert grassland already mentioned, the desert vegetation consists mainly of stunted scrub. Three types may be recognized, the sage brush of the northern desert area, the creosote bush of the southern desert area, and the more specialized greasewood of the salt deserts.

Forest Products.—From the above account of the forest belts, it will be evident that the merchantable timber is derived

from several areas. The four main areas of softwood were mentioned in Part I (p. 186) :

(1) New England and (2) The Lake States all now consume more than they produce except Maine, and, to a less extent, New Hampshire and Vermont.

(3) The Gulf States now supply the most important soft timber—yellow pine.

(4) The Pacific States have the largest reserves (especially of Douglas fir) and Washington is now the leading lumber state.

The Lumber Industry.—The sawing of lumber and the working of lumber constitutes the leading industry of twelve or fourteen

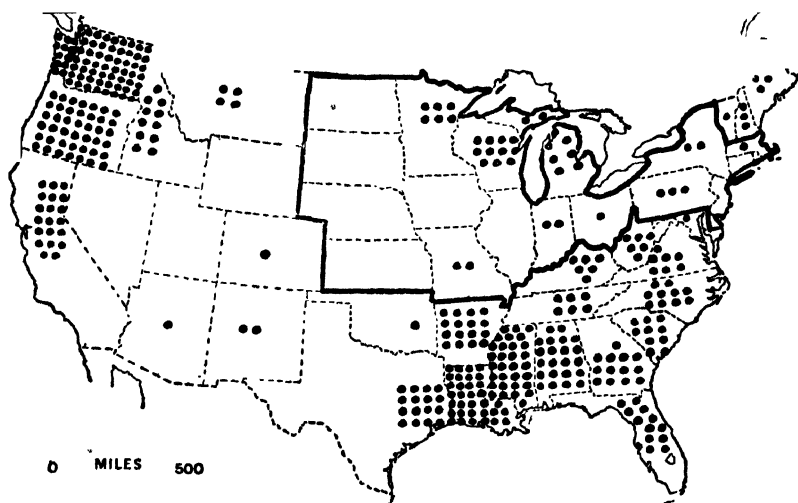


FIG. 239.—The timber production of the United States, 1926.

Each dot represents 100,000,000 board feet of timber. The predominating importance of the south-eastern and north-western States should be noted. Those States within the heavy black line cut less than a quarter of the timber they consume (in part after Whitbeck).

states and ranks third after steel products and textiles in the number of men it employs. Yellow pine and Douglas fir are the leading timbers, followed by oak and then by western yellow pine, hemlock or white pine (Census of 1920). Exports amount to rather less than 10 per cent. of the cut.

The Pulp and Paper Industry.—Spruce supplies more than half the paper-pulp made in North America and as it is being rapidly exhausted in the United States, imports from Canada of pulp and paper become more important every year. Most of the pulp mills are in the north-eastern states, especially New York, but there are also large numbers in Wisconsin. Supplies of raw material, hydro-electric power, and the nearness of markets for the finished products

are the determining factors. For further details, see Part I (pp. 187-8) and Canada (p. 282).

Other Forest Products.—"Naval stores" is a common American term for turpentine, resin, and pine tar, prepared by distillation from the liquid which is obtained by tapping the long-leaved pines of the southern forests. The Gulf States and Georgia, but especially Florida, are the leading producers. Savannah in Georgia is the world's chief market.

The use of hemlock and oak barks as a source of tanning materials has been largely superseded by imported supplies of quebracho and chromium salts. The small leather tanneries once scattered through the Appalachian and northern hardwood forests have been replaced by large factories in such cities as Philadelphia, Milwaukee, and Chicago. The local furniture-making industry of the hardwood forest belt has shared the same fate and has been largely replaced by the large factory industry in such centres as Grand Rapids, Michigan. The old industry which utilized hardwoods for the manufacture of agricultural implements was widespread both in hardwood forest regions and in regions where the finished implements were most in demand. Steel has replaced hardwood, but the manufacture of agricultural implements is carried on in many of the old areas.

Forest Conservation.—The need for forest conservation was not realized until most of the eastern forests had passed into private ownership, but 200,000,000 acres of forest in the western states have been set off as "national forests," to be managed on the principles of scientific forestry.

Agriculture.—Despite the importance of its manufactures, the United States is still pre-eminently an agricultural country. In a broad general way the republic may be divided up into a number of agricultural belts, to which reference is commonly made in ordinary parlance. The rainfall line of 20 inches per year cuts the United States roughly into two halves. Nine-tenths of the arable land lies to the east of this line. To the east of the line, from south to north there are five agricultural belts (shown in Fig. 240): (i) the sub-tropical coast belt with sugar and rice; (ii) the cotton belt; (iii) the corn and winter wheat belt; (iv) the corn belt; (v) the spring wheat belt (north-west), and mixed farming-dairying belt (north-east). Of these: (i) is often considered as part of the cotton belt; (iii) and (iv) may be merged together as the corn and winter wheat belt.

To the west of the line lie (i) the stock-farming country of the great plains or short grass prairies; (ii) the sheep lands of the intermontane plateaus, and (iii) the grain and fruits belt of the Pacific coast.

These divisions are very useful ones and should be carefully noted.

The following tables are included to illustrate the relative importance of the various field crops and farm animals : ¹

MILLIONS OF ACRES

Farm area.		1909-13	1922-25	1929-30
		955.9	955.9 ²	986.8 ²
Improved land	. . .	478.5 ²	503.1 ²	522.4 ²
Corn . . .	. . .	104.2	102.4	83.5
Wheat . . .	. . .	47.1	58.6	61.0
Oats . . .	. . .	37.3	42.4	39.4
Barley . . .	. . .	7.6	7.6	13.0
Rye . . .	. . .	3.2	5.0	3.4
Cotton . . .	. . .	34.1	39.4	45.4
Tobacco . . .	. . .	1.2	1.8	2.1

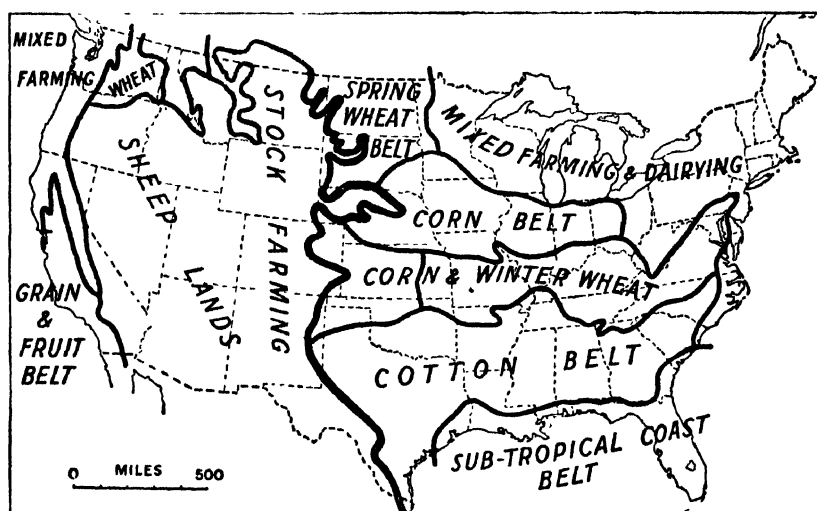


FIG. 240.—The agricultural regions of the United States. (After O. E. Baker.)

The heavy black line marks the division between the generally arid west and the humid east. In the north-east and north-west tracts of forest country, continuations of the main areas in Canada, are not separately shown.

MILLIONS

Live stock	1913	1921-25	1930
Horses	21.0	17.2	13.2
Mules	4.5	5.7	5.4
Cattle	56.6	64.0	59.7
Sheep	49.7	38.4	51.4
Swine	58.9	60.2	55.3

¹ Keep up to date from the *International Year Book of Agricultural Statistics*.

² Census returns, 1910, 1920, and 1930 respectively.

Wheat.—Mention has already been made of the quite distinct "spring wheat" and "winter wheat" belts of the United States. The spring wheat belt is a continuation of the Canadian prairie wheat region; the winter wheat belt lies south of the main corn belt and north of the cotton belt and produces about two-thirds of the United States crop. The broad twofold division into "hard" and "soft" wheats is not quite the same as that into "spring" and "winter" wheats. Hard wheats usually grow in a dry climate, have a high percentage of gluten, and make the lightest bread. They are mostly spring wheats, but hard winter wheats grow in the drier regions as far south as Texas. A comparatively recent introduction into America are the "durum" wheats—hard wheats well

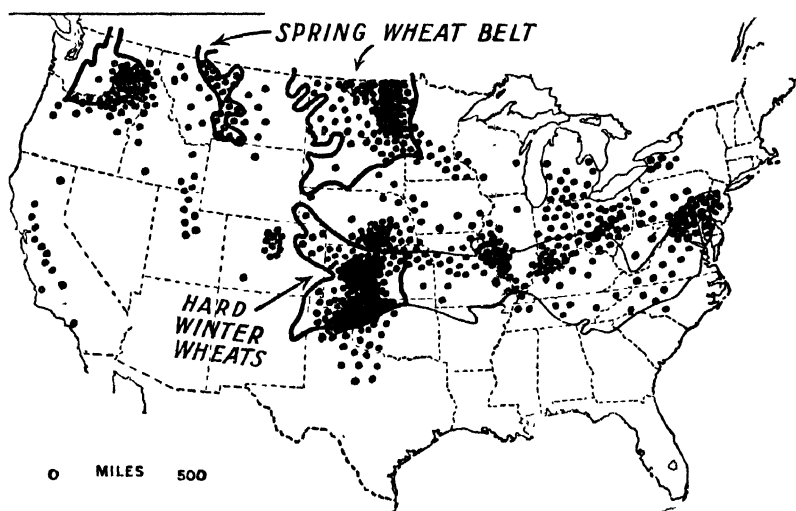


FIG. 241.—The distribution of wheat in the United States.

Each dot represents approximately 1,000,000 bushels. The areas enclosed by lines are the various wheat belts shown on Fig. 240. Based on 1926 figures (831,000,000 bushels).

known in dry lands of Europe, and thus specially adapted for dry climates. They are excellent macaroni wheats, and are blended with soft wheats in grinding bread flour. The soft wheats include most of the winter wheats and are of two types, red and white. According to the official classification five commercial classes of wheat are distinguished: three hard wheats (red spring, durum, and red winter); two soft wheats (red winter and white). The production of wheat has shown, on an average, a steady increase whilst the centre of production has moved gradually westwards. Extension of wheat cultivation and expansion of railways have, as in Canada, been closely linked. It is said to be unprofitable to raise wheat more than 20 miles from a railway. Much of the wheat from the spring wheat belt is shipped *via* the Great Lakes, but in the winter wheat belt

the wheat depends entirely on the railway. The important centre of cultivation in the moister, northern parts of the intermontane plateaus in Washington should be noted and also the Californian area of production. With the development of bulk handling, there has been a marked tendency for the concentration of the flour-milling industry in well-marked centres, notably Minneapolis,

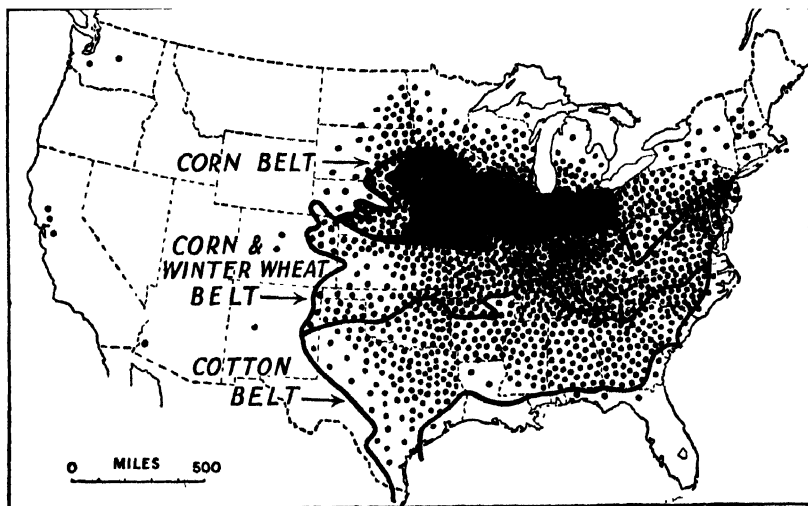


FIG. 242.—The distribution of maize or corn in the United States. Each dot represents approximately 1,000,000 bushels. Based on 1926 figures (2,700,000,000 bushels).

St. Louis, Chicago, Kansas City, and Wichita, but the older centres of New York and Buffalo remain important. Out of the huge annual production, less than a quarter is normally available for export.

Corn.—Corn or maize is the largest cereal crop in the United States and is greater in quantity than all the other cereal crops



FIG. 243.—The utilization of maize or corn grown in the United States. The very large proportion—83·5 per cent.—which never leaves the farms on which it is grown is very noteworthy.

combined. Yet 85 per cent. is consumed on the farms—for the most part on the farms where it is grown—practically the whole being fed to pigs, horses and mules, cattle, poultry, and sheep. Thus the importance of the corn crop is in its relation to the meat industry. By selective breeding, varieties have been evolved which will ripen even in the short summers of the northern states whilst southwards

corn is the second crop throughout the cotton belt. The percentage of the corn crop used for human food is only about 10; the percentage of the total exported being between less than 1 (1930); the percentage ground in corn-flour mills about 7.

Oats.—Oats, like corn, are largely consumed by the animals on the farms where they are grown. They thrive especially in the cool, moist, northern states. The home supply is supplemented by an import from Canada.

Rye.—Rye only constitutes about 1 per cent. of the total cereal crop of the United States and is grown mainly on the more sandy soils—too poor for wheat—of the Lake States and along the northern Atlantic coast.

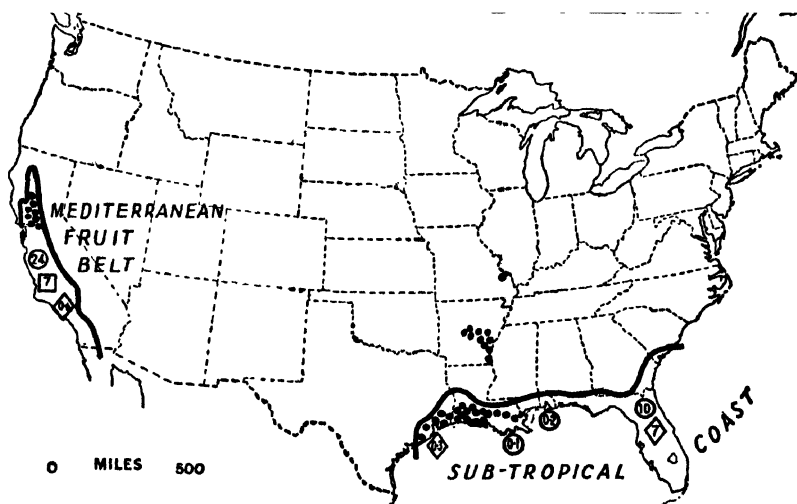


FIG. 244.—Rice and citrus fruits in the United States.

Each dot represents 1,000,000 bushels of rice in 1926. Numbers in circles show million cases of oranges produced in 1926 (Florida, 15 in 1931; California, 35); numbers in squares million cases of lemons; numbers in diamonds, million cases of grape-fruit (Florida, 11 in 1931).

Barley.—Barley is also a crop of slight importance and is grown mainly for feeding stock in the spring wheat areas.

Rice.—Rice is now increasing along the sub-tropical Gulf coast and on irrigated land in the Sacramento valley of California. Modern machinery has revolutionized rice-cultivation as generally practised in Asia, and despite the cheapness of Oriental labour, United States rice, now produced in excess of home requirements, can compete abroad with Asiatic rice.

Buckwheat matures quickly, and can be grown in the north-eastern states where a late wet spring has ruined the possibility of a good wheat crop; *millets* or *sorghums* have been introduced to make possible a crop on warm dry lands otherwise useless.

Sugar.—Cane-sugar grows in the sub-tropical belt, but is

important only in Louisiana. About three times as much beet sugar is grown as cane, mainly under irrigation in the west, but the quantity is small and the bulk of the United States' needs is supplied by Cuba, Hawaii, and Porto Rico.

Fruits.—The growing of *citrus fruits* is a highly organized and very successful industry in California and Florida. Being sensitive to frost the production is practically limited to these two states and to Arizona. Oranges grow in the two areas; lemons are mainly from California, grape-fruit from Florida. The success of the California industry is largely due to the efficient co-operative California Fruit-Growers' Exchange which grades, packs, and markets the fruit throughout the country. *Mediterranean fruits* flourish in California, especially in the dry, sunny, irrigated lands of the southern

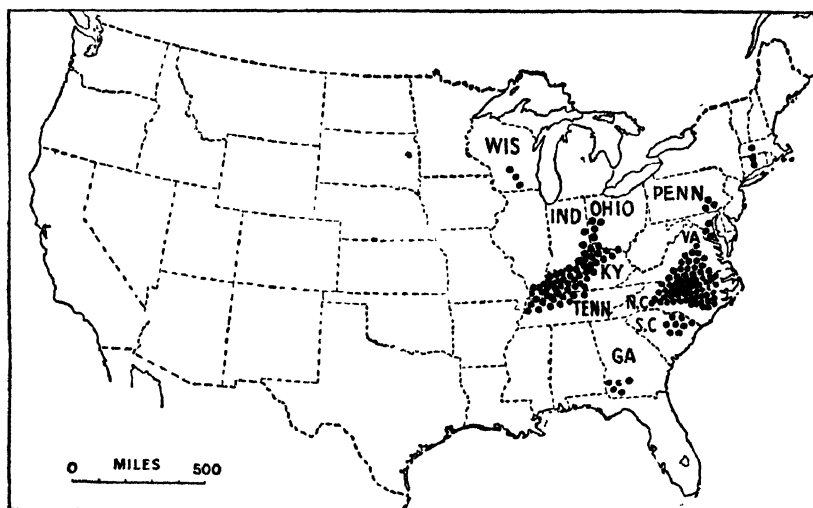


FIG. 245.—The distribution of tobacco in the United States.

Each dot represents 10,000 acres, based on 1926 figures.

part of the great Valley of California. The drying of peaches, apricots, raisins, and prunes, and the canning of peaches, pears, and apricots are now industries of first-class importance in California. Some grapes—for consumption fresh—are grown in the sheltered regions south of Lake Erie. *Temperate Fruits* are widely grown for local markets, but the valley of the apple crop exceeds that of the remainder combined. Apples are particularly important in the region of the Great Lakes (adjoining the apple lands of Ontario), in the state of Washington (adjoining British Columbia), and in the Ozark highlands.

Tobacco.—The United States grows about a third of the world's tobacco, largely in the States of North Carolina, Kentucky, Tennessee, Virginia, and South Carolina.

Market Gardening and Truck-farming.—Market gardening is conducted mainly in the vicinities of large towns which form the markets for the products. Truck farming is a term also peculiar to the United States, and implies the growing of vegetables at some distance from the markets so that they have to be sent by “truck.” The truck farmer tends to concentrate on one or more vegetables rather than produce the wide variety of the ordinary market gardener. The canning of vegetables is an important outlet for the produce of the truck farmer. Naturally market gardening and truck farming are concentrated in the north-eastern states, or broadly in the Eastern Climatic Province (see p. 312).

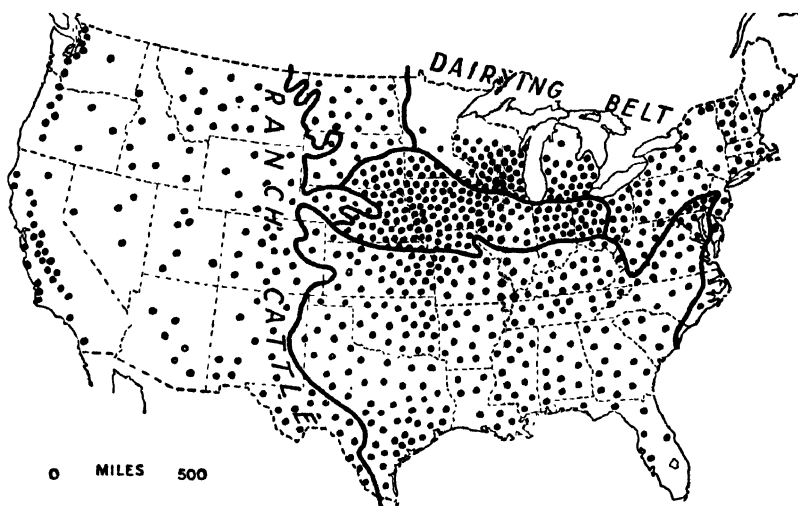


FIG. 246.—The distribution of cattle (beef cattle and dairy cattle) in the United States.

Each dot represents approximately 100,000 cattle, based on the numbers on January 1st, 1928 (55,700,000). The concentration in the corn belt should be noted.

Beans form a characteristic crop in Michigan (where many are canned, either there or in Chicago) and California; *Soya beans and ground-nuts (pea-nuts)* are grown especially in the Cotton Belt.

Cotton.—The most important of all the commercial crops of the United States is cotton. Since the United States produces between a half and two-thirds of the world's total, the Cotton Belt has already been considered in some detail in Part I (pp. 164–6, Fig. 136) to which reference should be made.

Hay.—Hay is second only to corn in value amongst the crops of the United States. Its principal use is as winter feed for cattle and sheep, hence its production coincides with dairying regions. Ensilage, or silage, made from the corn plant cut green, chopped by machinery, and stored in tall tanks called silos, is an important food

for dairy cattle in winter. Alfalfa is the leading hay crop in the irrigated lands of the west.

Live Stock.—Beef Cattle.—There are two areas in the United States of first-class importance in the rearing of beef cattle.

(a) On the Great Plains and among the mountains of the west large herds of cattle are allowed to range over wide tracts either of Government land or privately owned ranches. These range cattle receive little care and would furnish indifferent beef. The usual practice is to ship them to the farms of the Corn Belt where they are fattened on corn before being sent to the slaughtering and meat-pack'ng works.

(b) Many cattle are reared in the Corn Belt itself.

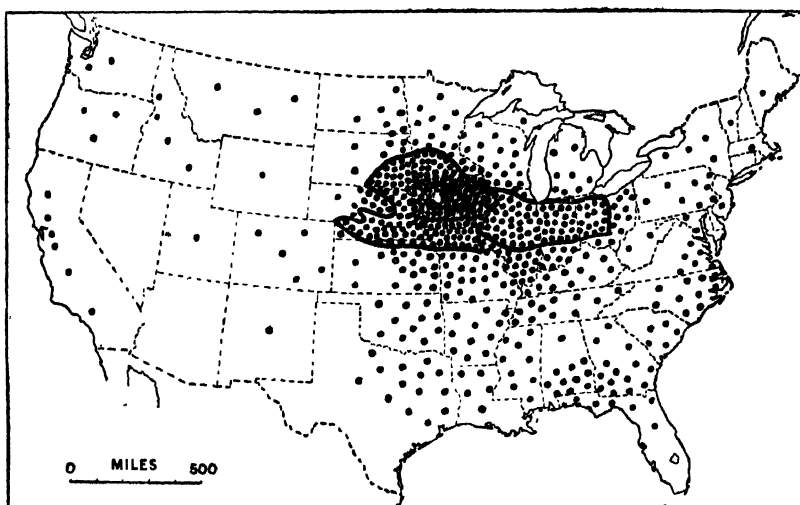


FIG. 247.—The distribution of pigs in the United States.

Each dot represents approximately 100,000 pigs, based on the numbers on January 1st, 1928 (59,000,000). The thick black line encloses the "Corn Belt" (see Fig. 240), in which area are reared half the pigs in the United States.

Dairy Farming.—The need for supplies of fresh milk in all great centres has resulted in the wide diffusion of dairying. But there is a marked concentration in the north-east, along the northern edge of the Corn Belt. Wisconsin makes about two-thirds of the cheese made in the States, New York and Pennsylvania also having an important production. Wisconsin, Minnesota, and Iowa are the leading butter-making states.

Pigs.—Pigs assume a greater importance in the United States than in most countries. The majority are found in the eastern half of the republic and more than half of the total in the Corn Belt. Pigs alone consume 40 per cent. of the enormous corn crop of the

country. Apart from a large home consumption, there is a big export of bacon, ham, lard, and other pig products.

Sheep.—Sheep are primarily the animals of the dry, western half of the United States. The consumption of mutton in the States is small, and the sheep are reared mainly for wool, but do not supply sufficient for home requirements. A few million goats are raised in the driest parts of the south-west.

Horses and Mules.—With the increased use of motors and agricultural machinery the proportion of horses and mules (formerly 1 to every 4 persons) relative to population is decreasing.

Poultry.—100 eggs and 5 fowls are consumed annually by every man, woman, and child, in the United States, so that enormous numbers of poultry are kept in all the grain-growing states.

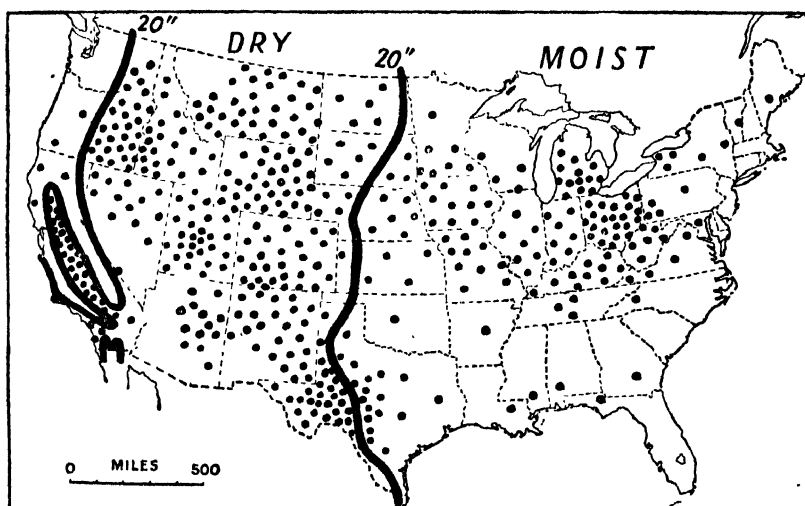


FIG. 248.—The distribution of sheep in the United States.

Each dot represents approximately 100,000 sheep, based on the numbers on January 1st, 1928 (44,500,000). Most of the sheep are in the dry, western States (small mountainous areas with more than 20 inches of rain have not been separately shown).

Slaughtering and Meat-packing.—In the value of products, this is the most important of all the manufacturing industries of the United States. The development of cold storage and the use of refrigerator cars have enabled the industry to be concentrated in a small number of cities, notably in Chicago and elsewhere in the Central States (Kansas City, Omaha, St. Paul, St. Louis, and Indianapolis). Other centres are New York City, Jersey City, and Buffalo.

The United States leads the world in the manufacture of leather, and despite the huge number of animals slaughtered at home, may import as many as 100,000,000 hides and skins. Leather working

is situated either in such of the meat-packing towns as Chicago and Milwaukee, or in older centres such as Philadelphia and Boston.

Fisheries.—As in Canada, three main fisheries may be distinguished—the Atlantic, the Pacific, and the Inland fisheries. The United States fisheries are more valuable than those of any other country.

The Atlantic Fisheries are most important on the New England and North Atlantic coasts. Inshore fish include the menhaden, used as a source of oil, the shad, and alewife; open sea fish include cod, halibut, hake, and haddock. Crabs are caught in large numbers especially in Chesapeake Bay, whilst the Atlantic and Gulf coasts yield more oysters than any other part of the world, the centre being Chesapeake Bay.

The Inland Fisheries are of relatively smaller importance and are mainly the Great Lakes fisheries already mentioned under Canada. The well-known “clams” or mussels are found in the Upper Mississippi and some of its tributaries.

The Pacific Fisheries centre around the salmon-catching areas of Alaska, Puget Sound, and the Columbia River. The annual pack exceeds 170,000 tons or 7,000,000 cases of 48 lb. each. Fish hatcheries now supply enormous numbers of tiny fish to the streams, otherwise the number of salmon would be rapidly depleted.

Total Value of Primary Production.—The following table shows the relative value of the principal types of primary production and the secondary production in the United States, and should be compared with the corresponding table for Canada.

MILLIONS OF DOLLARS

	1909	1921	1929	1933
Agriculture	8,500	21,425 ¹	8,675	5,985
Forests, timber (raw material) .	508	—	—	—
Mining	1,890	6,015 ²	5,876	2,488
Metallic	755	1,500 ²	1,476	411
Non-metallic	1,135	4,515 ²	4,400	2,077
Fisheries	54	87	—	—
Manufactures :				
Finished products produced .	20,670	43,650	70,435	31,359
Raw materials used	12,145	25,340	38,550	16,748
Food products	3,940	7,850	12,024	6,604
Textiles	3,055	6,960	9,243	4,811
Iron and steel products	3,160	5,600	7,138	2,463
Chemicals	1,430	4,540	3,759	2,118
Paper and printing	1,180	3,150	5,062	2,917
Vehicles	560	2,510	6,047	—
Lumber and products	1,580	2,430	3,592	1,127

¹ 1919.² 1923.From the *Statesman's Year Book*.

Notice the effect of the great depression in the figures for 1933.

Manufactures.—Although in the value of goods manufactured the United States ranks first amongst the countries of the world, the country is not essentially an industrial one in the same way as Great Britain is. Amongst the factors which have conduced to the rapid rise of many manufacturing industries may be mentioned the abundant and easily exploited fields of good coal, conveniently situated, the abundance of iron and other metals, of raw materials generally, and the large home market afforded by the population of 123,000,000 people. The early settlers naturally sought to establish the industries of their home countries and the New England States became the early seat of many manufactures. Manufactures, like cultivation, have spread westwards, and the main manufacturing area of the United States now stretches from the New England

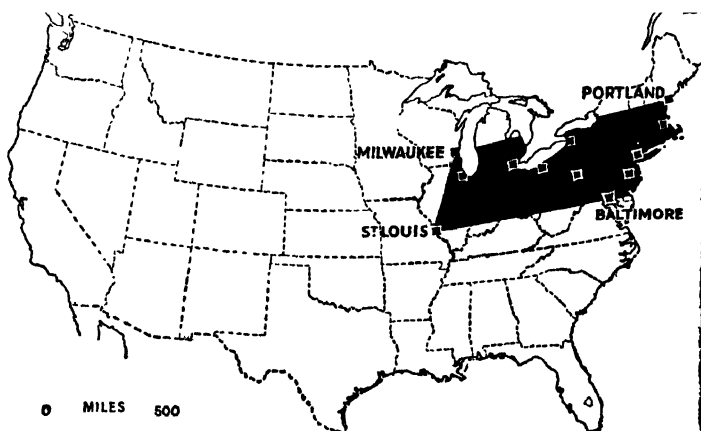


FIG. 249.—The chief manufacturing region of the United States.

About two-thirds of the manufactures of the United States, as measured by value, are produced in the area marked black. This area also includes the ten leading manufacturing cities—in order of value of output in 1920—New York, Chicago, Philadelphia, Detroit, Cleveland, St. Louis, Baltimore, Pittsburg, Buffalo, and Boston.

States, New York, and Baltimore on the east, to Chicago, Milwaukee, and St. Louis on the west. The leading manufacturing cities, according to the census of 1920, are New York City, Chicago, Philadelphia, Detroit, Cleveland, St. Louis, Baltimore, Boston, Buffalo, and Pittsburg.

A census of manufactures is taken every two years in the United States, and for that purpose the industries of the country are divided into sixteen broad groups. Some of these have been mentioned in the table on the opposite page, but further details may now be given. The figures are for the census year 1929, before the great depression, but totals for 1933 are given for comparison.

INDUSTRIAL CENSUS OF 1929

Groups.	Employees.	Wages.	Cost of Materials.	Value of Products.
	Thousands.	Millions of Dollars.	Millions of Dollars.	Millions of Dollars.
1. Food	753	898	8,638	12,025
2. Textiles	1,708	1,733	5,074	9,243
3. Iron and steel	883	1,381	3,865	7,138
4. Lumber and products .	876	939	1,585	3,592
5. Leather and products .	318	359	1,132	1,906
6. Rubber products . . .	149	207	579	1,117
7. Paper and printing . .	591	1,013	1,861	5,063
8. Chemicals	281	354	1,971	3,759
9. Stone, clay and glass .	328	433	527	1,561
10. Non-ferrous metals . .	315	442	2,466	3,601
11. Tobacco	116	95	429	1,246
12. Machinery	1,085	1,614	2,703	7,043
13. Musical instruments .	33	44	68	178
14. Vehicles, etc.. . . .	587	943	3,683	6,048
15. Railroad repair shops .	397	637	548	1,270
16. Miscellaneous	417	501	1,360	3,427
TOTAL	8,836	11,684	38,520	70,420
Totals, 1933 Census .	6,056	5,261	16,748	31,359

It will be noticed that all the figures for 1929 show a very big increase on those for 1921 (shown in the preceding table), when there was an industrial depression, but those for 1933 are lower than 1921. In the details which follow references are to the 1929 census since the results of the census *after* the depression are not yet ready.

Food Industries.—Most of these industries are concerned with the preparation of the raw materials of the indigenous agriculture, and have already been mentioned in that connection. There are, however, two aspects which deserve further mention. One is the enormous importance of canning and preserving—of fruit, vegetables, pickles, sauces, fish, meat, etc.—and the other is that of the popularity and consequent importance of “patent foods” or prepared cereals. Over 100,000 people are engaged in canning fruit and vegetables alone, whilst the output of the canneries, excluding meat and milk, represents an annual value of 25s. for every man, woman and child in the whole country. Tomatoes vie with pork and beans in popularity, whilst peas, corn and peaches are close favourites. Geographically the industry is widespread, but two areas stand out—California and the Atlantic trucking region. California has, naturally, almost a monopoly of Mediterranean fruits such as peaches and apricots as well as of pears and asparagus, and amongst urban centres Oakland is noteworthy. The Atlantic trucking region is more especially concerned with tomatoes and vegetables, whilst the Corn Belt provides the bulk of the corn as well as many other vegetables. It may be mentioned that the manufacture of tin cans alone employs 31,000 people using tin plate purchased from elsewhere.

Amongst food industries depending on imported raw materials, cocoa, chocolate, and confectionery (including chewing gum) may be specially mentioned not only because of their importance but because of the geographical factors which determine the location of these industries in New York, Massachusetts and Pennsylvania near the seaboard and in the older industrial centres. Illinois, however, is getting a larger and larger proportion of the trade.

Textile Industries.—The greatest textile industry is, of course, the cotton industry. There are now two main areas of cotton manufacturing:

(a) The old centres of New England, whose foundation is due to the immigration of spinners and weavers amongst the early settlers and whose position is often determined by the presence of water power.

(b) The newer centres in the Cotton Belt itself.

The outstanding feature of post-war development is the rapidity with which the newer centres have passed their older rivals and now have a much larger output. Amongst the old centres Fall River, Lowell, New Bedford, all towns of over 100,000 inhabitants in Massachusetts, are the chief. At present the Cotton Belt

are smaller towns, but North and South Carolina and Georgia are the leading states.

As in England, "knit goods" of cotton (especially hosiery and underwear) tend to be manufactured at centres different from those of ordinary cotton weaving. But this branch of the industry alone employs over 208,000 workers. Philadelphia, Milwaukee, New York, Reading (Penn.) may be noted as leading centres, whilst at some towns, such as Utica (N.Y.) and Knoxville (Tenn.), it is the leading occupation.

The woollen industry tends to remain in those north-eastern states, especially Massachusetts, where it was established by the early settlers. Philadelphia has an important woollen and worsted industry.

The silk industry in the United States is again in the same area, and is the staple industry of Paterson, N.J., and of Scranton, Penn.

With the textile industry may be mentioned the clothing manufactures—of outstanding importance in New York and in many larger towns, such as Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Los Angeles, Milwaukee, Newark, Philadelphia, Rochester and San Francisco.

Leather and Products.—It has already been noted that the United States leads the world in the production of leather and, despite the huge numbers of animals slaughtered at home, has a very large import of hides and skins. The boot and shoe industry is an important one, and there is keen competition between the old centres—notably New York, Rochester, Boston and Lynn (Mass.)—and the newer centres such as Milwaukee and St. Louis.

Rubber and Products.—The town of Akron in Ohio is pre-eminently the rubber town of the United States—the industry employs 149,000 workers in that town alone—though rubber manufacturing is carried on in several other towns.

Paper and Printing.—Printing is associated especially with such centres as New York, Boston, Chicago and San Francisco—situations determined obviously by markets.

Chemicals.—One of the leading centres is Newark. Paterson specializes in dyeing.

Pottery, etc.—It is impossible to detail the special centres, but Trenton, New Jersey, may be mentioned as an essentially "pottery town."

Non-ferrous Metals.—The working of brass, bronze, etc. is especially associated with such older centres as Waterbury and Bridgeport, Conn., as well as with centres of the motor industry, notably Detroit. Jewellery is manufactured at Newark and Providence in particular.

Tobacco.—Richmond, Tampa (Florida), New York and Detroit are large towns associated with the manufacture of cigars and cigarettes.

Machinery.—On the whole there is a localization of different types of machine manufacturing. Some of the older textile towns still specialize in textile machinery—for example, Worcester and Philadelphia—others of the older towns of the east in the finer types of electrical machinery (Philadelphia, Pittsburg, Newark, Hartford), but there is competition from such towns as Milwaukee. Machine tools, etc. are made in many of the motor centres.

Vehicles.—The motor-car industry has reached amazing proportions in the United States. It is not so much the supply of iron and other metals which has determined the location of the industry as the factor which may be designated geographical inertia. Geographically the motor-car of to-day is the descendant of the hardwood carriages and wagons made from local wood. Hence the industry is centered especially in the old hardwood areas. The leading centre is Detroit, where the industry employs over 100,000 workmen, but there are other centres in Michigan and the neighbouring states of Ohio, Indiana, Illinois and Wisconsin—at such towns as Indianapolis, Milwaukee, Philadelphia, Cleveland, Buffalo, etc. Some idea of the huge proportions to which the automobile has attained may be gained from the following figures. In value of output it exceeds any other single manufacturing industry except slaughtering and meat packing. For the years 1923 to 1929, the average output was over 4,000,000 cars per annum—including nearly half a million trucks and buses. The total in 1929 was 5,316,000.¹ At the same time there were registered at the end of 1930 over 26,000,000 vehicles, or nearly one for every five persons in the country—roughly one for every average family. It is interesting to notice that the manufacture of motor cycles shows a steady decrease and the number made is quite small. On the other hand, the output of aircraft had reached nearly 6,000 in 1929. It may be mentioned here that various machine and metal-working industries are usually associated with the automobile industries, whilst the influence of the formerly existing hardwood forests is also seen in the furniture industry at such centres as Evansville (Ind.), Grand Rapids (Mich.) and St. Louis.

Shipbuilding occupies a relatively smaller position in the United States when compared with Britain. Just after the war the industry assumed large proportions, and in 1919 employed nearly 400,000 men, and ships were built to the value of \$1,625,000,000. But in 1929 only 59,000 were employed and the ships built were valued at \$230,000,000. Even so a large proportion of the tonnage is for use on the Great Lakes, and so Pennsylvania and Ohio ranked first and third respectively amongst shipbuilding states. On the

¹ Output 1932, 1,371,000 vehicles; 1935, 4,008,000 vehicles.

Atlantic shores, New York, New Jersey and Virginia are the leading states. Baltimore, formerly an important centre, has now an insignificant output. On the Pacific shores Oakland and Seattle are the leading centres.

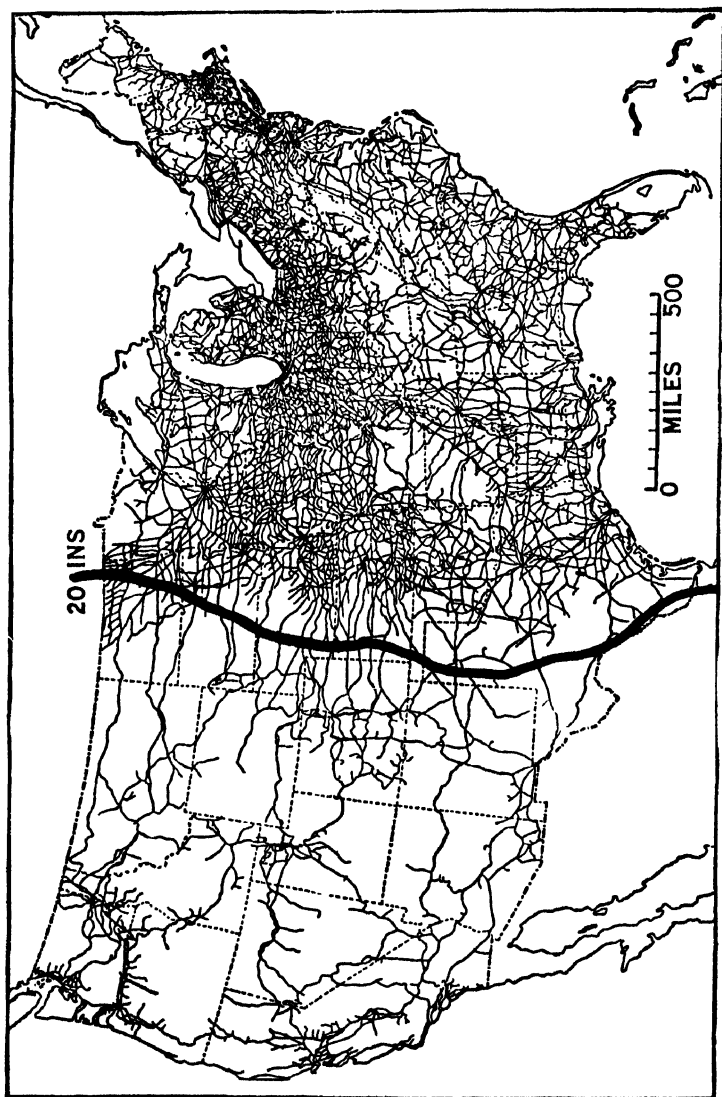


FIG. 250.—Railways of the United States. Notice the network in the wetter east.

Railroad Construction and Repair Works.—In dealing with the consumption of coal we had occasion to note the huge proportion taken by the railways. Similarly railway workshops employ a

remarkably large number of workers—over half a million. Some of the centres are determined by the ready availability of iron and steel—Jersey City, Chicago, Buffalo—others are more of the nature of route centres and include such out-of-the-way places as El Paso as well as Minneapolis, St. Paul, Columbus and Denver.

Miscellaneous Industries.—Of outstanding interest is the motion-picture industry of Los Angeles—which owes not a little of its success to the climatic conditions of the drier part of the Mediterranean region.

Communications.—*Waterways.*—Mention has already been made of the importance of the Great Lakes. As indicating in some way the importance of traffic, cost of transport of coal on a lake steamer is about one-fortieth of what it is the same distance by rail. In other parts of the United States it may be broadly stated that the railway has superseded the river and canal. Even the New York State Barge Canal, which connected Lake Erie with the navigable Hudson and thus linked the Great Lakes with New York, and which played a big part in the making of New York City, is now of relatively secondary importance.

Railways.—The United States has over a quarter of a million miles of railway—more than all Europe—and a third of the world's mileage. Early development was carried out by an immense number of small companies, and although these are now consolidated into a comparatively small number of large companies, there is not a single control from Atlantic to Pacific as in the case of Canada. Most of the great lines centre on Chicago. The English standard gauge of 4 feet 8½ inches is used throughout.

Roads.—The early turnpike roads, largely constructed and owned by private companies, who collected tolls at the toll gates, were superseded by the railways, and the importance of the road has really only been resuscitated in the present century by the coming of the automobile. Of a total length of 3 million miles of public roads 23 per cent. (1934) are now properly surfaced. America has been to the fore in the use of reinforced concrete as a road material.

Ports.—A considerable change has taken place in the relative importance of the seaports in the United States. This change is largely the result of the opening of the Panama Canal. In 1912, before the opening of the Canal, the Atlantic Coast had two-thirds of the total foreign trade, the Gulf Coast about one-seventh; the Pacific coast only one-seventeenth, whilst the remainder passed by the northern boundary.

PERCENTAGE OF FOREIGN TRADE

	Imports.		Exports.	
	1913-14	1930	1913-14	1930
Atlantic ports	72.3	66.7	55.1	47.6
Gulf ports	6.4	6.5	23.9	21.8
Pacific ports	7.3	11.2	5.8	11.1
Northern border	10.8	14.0	14.4	17.1
Others	3.2	1.6	0.8	0.4

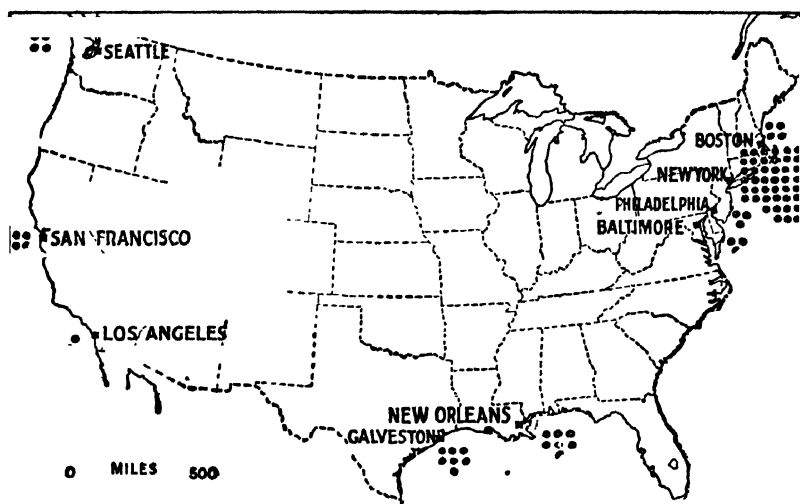


FIG. 251.—The principal ports of the United States
Each dot represents 1 per cent. of the foreign trade.

The leading ports and the proportion of the total foreign trade passing through them in 1912, 1927, and 1930 is shown below :

	1912	1927	1930
New York	49.6	42.6	41.2
Boston	5.2	3.7	3.0
Philadelphia	4.0	2.8	3.9
Baltimore	3.0	2.5	2.3
New Orleans	5.9	6.4	6.0
Galveston	5.8	7.1	6.0
San Francisco	2.8	3.6	4.4
Seattle	2.6	4.0	—
Los Angeles	0.1	2.3	—

Care should be taken in estimating the hinterlands of these ports.

Foreign Trade.—In a country as vast as the United States, it is inevitable that there should be a huge internal trade. The external commerce, vast as it is, is small in comparison with the internal trade. With an area and resources commensurate with the

whole of Europe, the total value of the foreign trade is still slightly less than that of the British Isles.

Exports.—Fig. 252 shows the rise in value of exports in recent years. The United States is still comparatively a young country, and so exports of raw materials and food-stuffs still occupy the leading

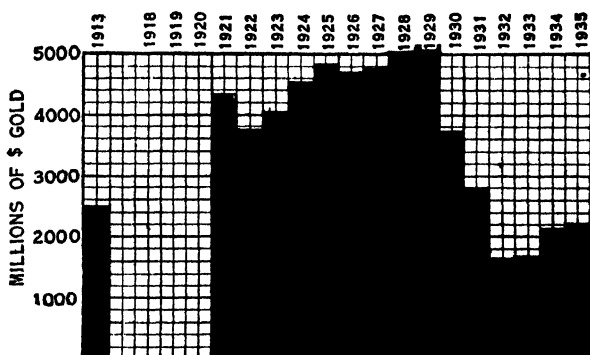


Fig. 252.—The exports of the United States.

The figures for 1918 were 6,048 ; 1919, 7,750 ; 1920, 8,080 millions of dollars ; 1933, 1934 and 1935 in U.S. dollars.

positions amongst exports. But nearly every year sees manufactured goods occupying a larger percentage of the total, and of course, an increasing intrinsic value. Fig. 253 shows the leading items. The high position occupied by cotton should be noted.

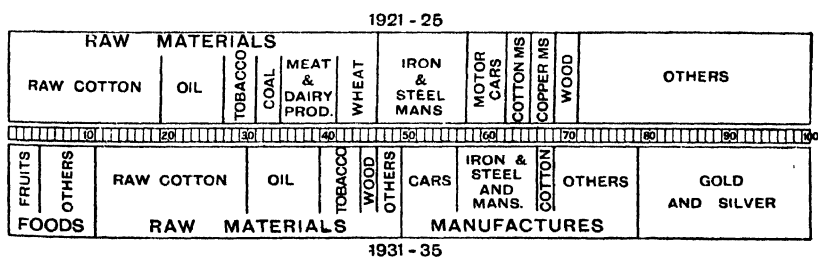


Fig. 253.—The exports of the United States.

Imports.—Fig. 254 shows the rise in value of imports in recent years. The important imports really fall into three classes :

(a) Products of tropical and equatorial regions which cannot be produced in the United States—or cannot be produced economically. The chief are rubber, cane sugar, coffee, fibres, and tea, with tropical fruits and spices, silk, and cabinet woods.

(b) Manufactured goods of high grade, especially from Europe.

(c) Mineral substances in which the United States is lacking
---notably tin and diamonds.

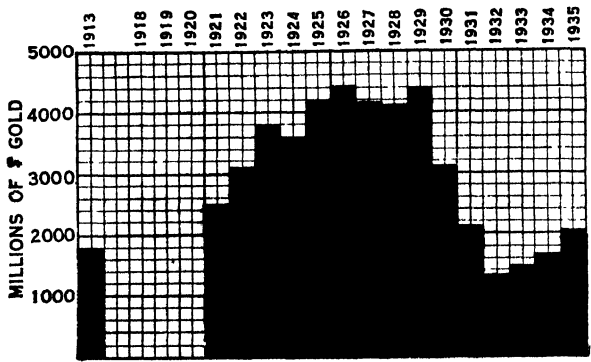


FIG. 254.—The imports of the United States (general imports including re-exports).

The figures for 1918, were 3,031; 1919, 3,004; 1920, 5,278 millions of dollars; 1933, 1934 and 1935 in U.S. dollars.

In recent years a fourth class has come into being—products of substances of which the United States is becoming exhausted, notably wood pulp and paper. The principal items are shown in Fig. 255.

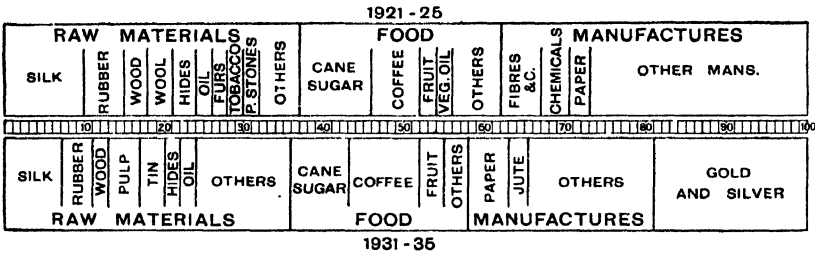


FIG. 255.—The imports of the United States.

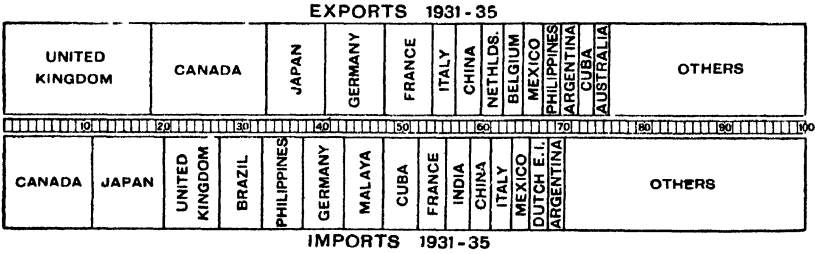


FIG. 256.—The direction of the foreign trade of the United States.

Direction of Foreign Trade.—The foreign trade of the United States is widely distributed. Thus, in 1930-31 no one country supplied more than 14 per cent. of the imports (Canada 13·3; United

Kingdom 6.6, Japan 9.9). On the other hand, the United Kingdom is easily the best customer, taking 18.5 per cent. of the exports in 1930-31, followed by Canada, 16.5 per cent. Other details are shown in Fig. 256.

THE NATURAL REGIONS OF THE UNITED STATES

We have already treated the United States as a whole from several points of view, and only a very brief description of the "natural regions" will therefore be given now. We have seen how the United States may be divided into physiographic regions, into

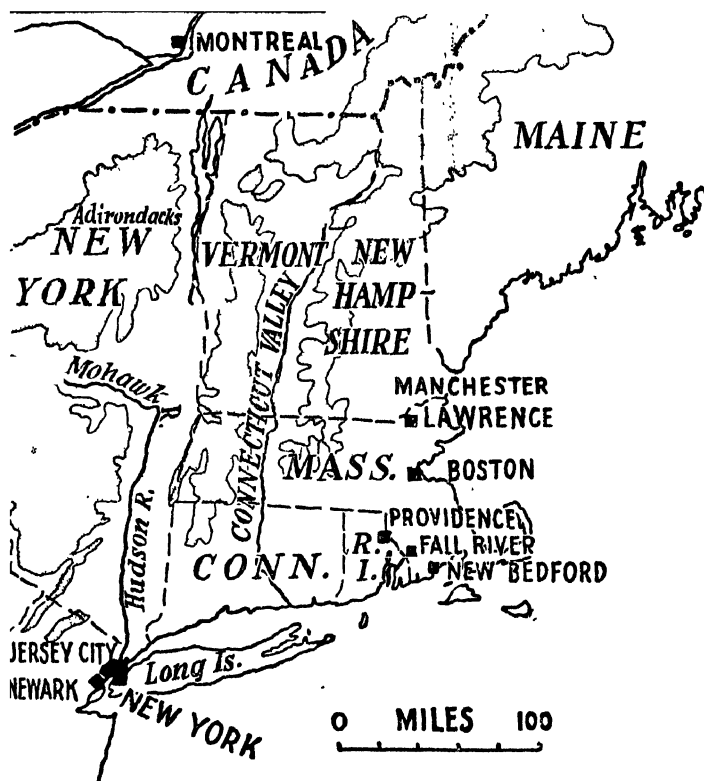


FIG. 257.—The New England States. Land over 1,000 feet, dotted.

climatic regions, into vegetation belts and into major agricultural regions. Any one of these major divisions may serve as a basis for a more detailed division into "natural regions." This explains the diverse character of the "regions" which are described in different books. We will here make but a simple division, based upon the physiographic and agricultural regions.

THE NEW ENGLAND STATES

The New England States of Massachusetts, Connecticut, Rhode Island, Maine, Vermont, and New Hampshire are closely connected in structure and character with the Maritime Provinces of Canada. Forming the northern part of the Appalachian mountain system, the folded rocks and the rugged hills to which they naturally give rise trend generally south-south-west to north-north-east. The outcrops of the younger and softer rocks result in the more fertile and thickly populated valleys and lowlands. With the St. Lawrence type of climate¹ and a well-distributed rainfall there is no lack of water. The early settlers took advantage of the swiftly flowing streams as motive power for their primitive mills, and established a great manufacturing region in a country having neither coal nor oil. To-day hydro-electric power carries on the work. On the whole the country slopes towards the Atlantic and is most rugged in the west, least so along the coasts. Apart from the rich Connecticut valley, the population has kept to the coastal tracts, where the valuable fisheries form a further attraction. With the agricultural community dairy farming, mixed farming, and fruit farming are the general rule, and the provision of supplies for the great manufacturing cities is the great outlet for the produce. Amongst manufactures, the woollen industry has centres at Lawrence and in the Blackstone valley, whilst Boston is the great woollen market of America; the cotton industry at Fall River, Manchester, Providence, and other centres; boots and shoes are manufactured in the towns around Boston; copper and brass in the Connecticut valley and paper and pulp in the northern tracts. The great outlet of the region is Boston—the nearest of the great United States ports to Europe, though it must be remembered that much of New England lies within the hinterland of New York.

THE APPALACHIAN REGION

The Appalachian Region, properly speaking, is separated from the New England States by the very important Hudson River gap. Together with the Appalachian region may be considered that part of the Atlantic coast—there deeply indented—which lies between New York and Newport News. Broadly speaking the whole region may be divided into parallel strips—The Appalachian or Alleghany Plateaus on the north-west; then the Appalachian Valley and its subsidiary ridges; then the main Blue Ridge Mountains; then the Piedmont Plateau of ancient rocks; and finally the coastal plain. The whole region contains more than one-third of the total population of the United States. Much of the land is too hilly to be cultivated, but mixed farming and dairy farming are

¹ See note on p. 294.

carried on in the sheltered valleys. But it is in this region that there lie the enormous supplies of coal. In the north the Pennsylvanian field produces as much coal as the whole of the British Isles, and more than half the total obtained in the States. Further south are the Middle Appalachian fields and the Southern Appalachian fields. There are two main lines of movement for the coal : one northwards to the Great Lakes (Lake Erie) and Canada ; the other eastwards through the river gaps (Delaware, Susquehanna and Potomac) to the

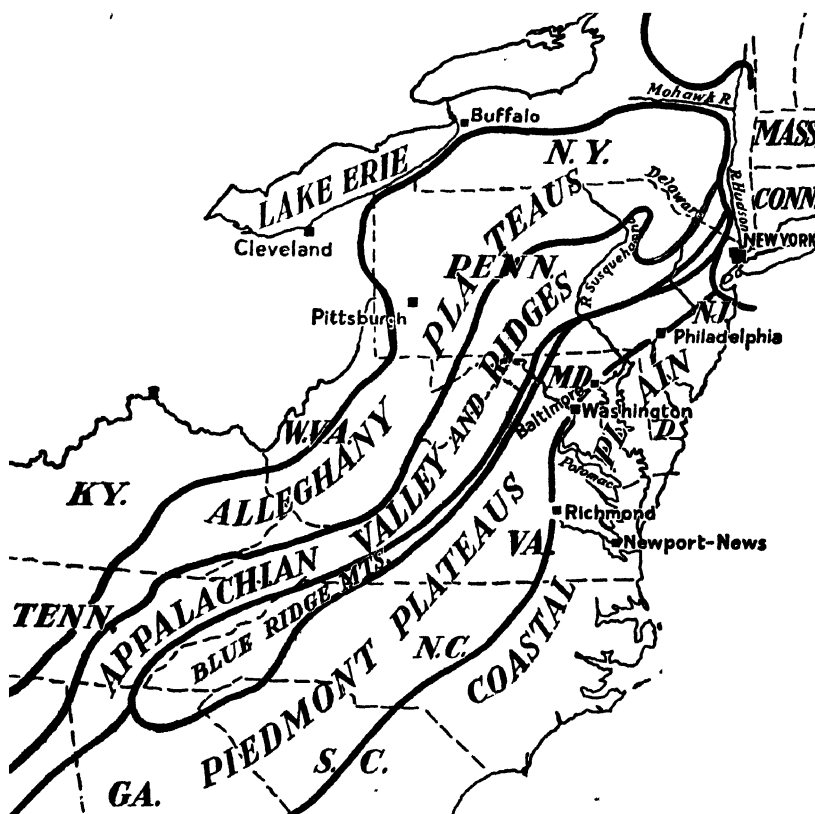


FIG. 258.—The Appalachian Region.

ports of Philadelphia, Baltimore, etc. Reference has already been made to the great iron and steel industry centring in Pittsburgh and Homestead, using ore brought from the Lake Superior ports. The manufacture of woollen goods is centred round Philadelphia, whilst silk goods are made in the States of Pennsylvania, New Jersey, and New York. Clothing is made especially in New York. A careful study should be made of the positions of *Newark*, *Jersey City*, *Philadelphia*, and *Baltimore*, and especially of *New York*. The

urban aggregate centring in New York City is unparalleled in the world, except possibly in the case of London. Situated on the mouth of the most important gateway to the interior, the rise of the city is closely connected with the improvement of this line of communication by the building of the Erie Canal from Buffalo to Albany in 1825, and the natural diversion of traffic to this route caused by the obstacle of Niagara. New York City of the present day progresses under the unalterable obstacle of its situation as a narrow island (Manhattan), but of which the solid granitic subsoil

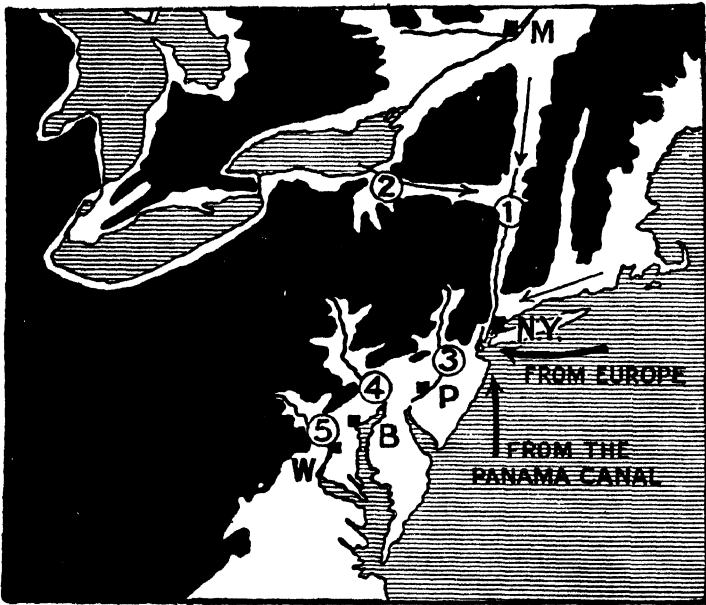


FIG. 259.—The position of New York, at the entrance to the Hudson-Mohawk Gap.
All land over 600 feet, black.

1—The Hudson River; 2—The Mohawk Gap; 3—The Delaware Gap with Philadelphia (P); 4—The Susquehanna Gap with Baltimore (B); 5—The Potomac Gap with Washington (W). Notice that the Hudson-Mohawk is the only complete gap affording access to the Great Lakes and also directly northwards to Montreal (M). No less than two canals and four main railways run down the narrow Hudson Valley to New York.

permits the building of skyscrapers, allowing the city to expand upwards where it cannot expand laterally. *Washington*, the beautiful capital of the United States, is on the Atlantic border of the Appalachian region.

THE SUB-TROPICAL COASTS AND FLORIDA

Along the coast strip of the Gulf of Mexico much of the land is marshy and useless. In those parts where soil conditions are suitable—notably in Louisiana—sugar-cane and rice are the

characteristic crops. The more sandy tracts are the home of the long-leaf pine. The Peninsula of Florida consists of low, flat or rolling sandy plains dotted with swamps, lakes, lagoons, and old shingle beaches. The warmth of the winter is the distinguishing feature of the Florida climate, and it is the climate which controls the three great industries of the peninsula. The first industry is the tourist industry, for Palm Beach, Miami, and Jacksonville form the winter playground of wealthy northerners. Several years ago it was estimated that these winter visitors spent \$300,000,000 a year. The second industry is citrus fruit-growing—oranges and grapefruit. The third industry is truck-farming—including the growing of pea-nuts. Over a hundred miles along the west of the peninsula are rich phosphate deposits—yielding two-fifths of the world's supply.

THE COTTON BELT

The limits of the Cotton Belt have already been defined in the section on Cotton in Part I. The areas of greatest production are the Black Waxy Prairies of Texas, the Mississippi-Yazoo Bottoms, and the Black Prairie Belt of Alabama. The Cotton Belt is virtually a one-crop region. Maize is the second crop but the amount grown is insufficient for home requirements. The razorback hog is an important animal. A large proportion of the negroes of the States are found in the Cotton Belt—as owners, tenants, or labourers on the cotton land. The Cotton Belt was originally nearly all forested; naval stores and pulp are now a product of the sandy soils which are still covered with pines. Near the north-west of the Cotton Belt lie the Mid-Continent Oilfields; near the south-west are the Gulf Coast Fields; near the north-east is the Southern Appalachian Coalfield. New Orleans, Galveston, Savannah, and Mobile are the leading outlets. Amongst inland towns, Birmingham, with its iron and coal, is particularly noteworthy, as is the spread of cotton manufacturing in the vicinity.

THE OZARK-OUACHITA HIGHLANDS

This island of 60,000 square miles of upland in the midst of the Central Plains is caused by a low dome in the generally almost horizontal rocks. The highlands are cut into two parts by the Arkansas Valley, the larger area, the Ozark Highlands, lying to the north. The region was originally forested, and the country was and is more difficult to settle than the surrounding fertile prairies. Corn is the chief crop, but there are considerable areas of fruit orchard. A fair amount of small timber still remains. Joplin, the western gateway to the Ozarks, is an important zinc-lead mining area.

THE CORN BELT AND THE CORN AND WINTER WHEAT BELT

This region, a quarter of a million square miles in area, is one of the finest blocks of farming land in the world. Most of the surface is covered by a fine deep glacial soil—the *débris* scooped out by the great ice sheet in forming the Great Lakes. But being far from the

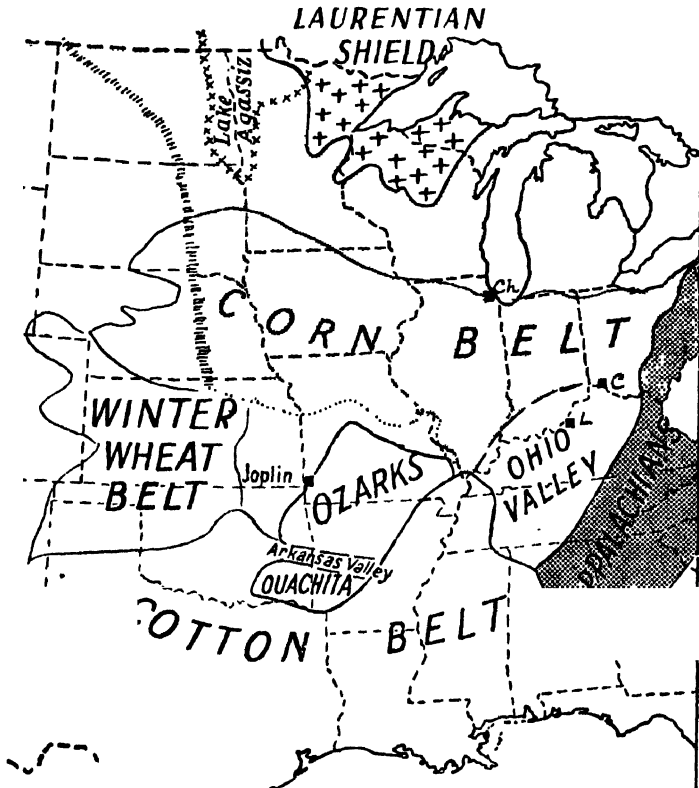


FIG. 260.—The Central Lowlands of the United States.

The area lightly dotted is the glaciated area covered with a deep fertile soil of glacial origin.

outcrops of hard rock, there are few large boulders to mar the surface from the farmer's point of view, and the surface of the Corn Belt is stoneless and gently undulating. The natural vegetation—hardwood forests in the south-east passing gradually to treeless prairie in the west—has now almost entirely disappeared. The Corn Belt is made up of a succession of farms with rich fields of corn, oats, hay, or wheat, herds of big cattle or fat hogs. More than half the grain acreage is in corn. The crops are so arranged as to secure a

well-distributed labour programme through the year. The real objective of the Corn Belt farmer is the fattening of cattle or hogs for the Chicago slaughterhouses.

In the dry western part of the belt much alfalfa is grown; with sorghums or millets in the south-west and durum and winter wheats in the west (the Winter Wheat Belt of Fig. 240). The Ohio valley to the east lies between the Corn Belt properly speaking, the Cotton Belt and the Appalachian Plateau, and differs from the main part of the Corn Belt in the hilly nature of the country. *Cincinnati* and *Louisville* are the principal centres.

As in the prairies of Canada, much of the Corn Belt is underlain by coalfields, as yet little used, and the cities of the region are collecting and distributing centres, or concerned in the preparation of the agricultural products.

THE NORTH-CENTRAL DAIRYING REGION

North-eastwards the Corn and Winter Wheat Belt passes into a region where dairying is the principal occupation. The position of Chicago on the fringe of this region and the Corn Belt should be noted. Northwards of the dairying regions lies that portion of the Laurentian Shield which projects from Canada into the United States; and where forestry and mining (iron and copper) take the place of dairying and constitute a natural region, sometimes called the Upper Lakes Region.

THE SPRING WHEAT REGION

This region is the United States portion of the Wheat Belt of Canada, and where Minneapolis-St. Paul in the south-east corresponds in some ways to Winnipeg on the east of the Canadian Belt. In the United States, however, the wheat lands do not extend to the foot of the Rockies, but are separated by a broad belt which is too arid—the Great Plains.

THE GREAT PLAINS

This region lies between the foot of the Rockies and the great agricultural lands of the United States—the Spring Wheat Belt, the Corn Belt and the Cotton Belt. With a greater evaporation than is found northwards in Canada, a rainfall of less than 20 inches makes farming difficult. Further, the irregular character of the rainfall gives promising crops one year and nothing for the next five. Irrigation is possible over limited areas only, owing to the depth to which many of the rivers have cut their valleys, especially in the well-known ‘badlands.’ The old type of ranching is still the principal occupation.

THE ROCKY MOUNTAINS

The Rockies, with their forests, poor and sparse in the south, their mineral resources and vast water-power possibilities, cannot be described in greater detail here.

THE INTERMONTANE PLATEAUS

In the south an arid grazing region of vast extent; in the north damper and with wheat and fruit, the mainstay of this huge

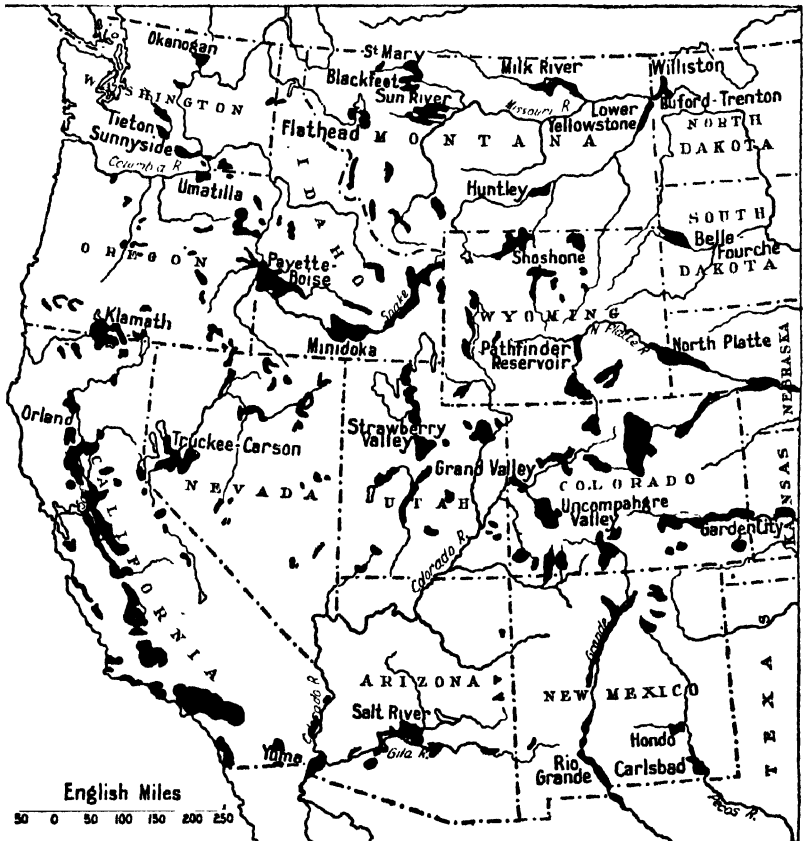


FIG. 261.—Irrigated areas in the arid west.

region is mining. This region as a whole produces three-quarters of the gold, nearly all the silver, most of the copper, and much of the lead of the United States. Fig. 261 shows the importance of irrigation, wherein lies the hope of much of the whole tract.

Lying between the Rocky Mountains on the east and the Sierra-

Nevada-Cascade Range on the west, the series of lofty plateaus is cut up by ranges of mountains of varying direction. Amongst the more important units the following may be mentioned.

The Snake River Plateau is formed of great sheets of lava which weather to a sticky black soil which retains moisture very well. Most of the plateau is covered with a poor grassland on which cattle graze, but large crops of grass are grown even without irrigation.

The Great American Desert is a region of inland drainage, in the centre of which lies the Great Salt Lake of Utah. So shallow is this lake that a railway has been built across it. Salt Lake City was founded by the Mormons, and by their efforts has grown to importance despite the aridity of the surrounding country. An extensive irrigation system has been constructed, and amongst other crops much sugar-beet is grown.

The Colorado Plateau is famous for the gorge or canyon of the Colorado River, 4,000 feet deep. The sides are almost vertical because the low rainfall causes little erosion.

THE NORTH-WESTERN COASTLANDS

Washington and Oregon stand very high in the production of lumber, and may be linked in general characters with the adjoining regions in British Columbia. Seattle is the great town and port, and has a large trans-Pacific trade, as well as a trade with Alaska. It is the outlet of the Puget Sound Valley and the Columbia plateau, with a climate closely comparable with that of England, and therefore capable of comparable agricultural development. The Columbia River cuts a way through the Coast Range and has allowed Portland to assume a considerable importance as an ocean port and to serve as the outlet of the fertile Willamette Valley.

CALIFORNIA, OR THE MEDITERRANEAN REGION

The Mediterranean region of North America corresponds fairly closely with the State of California. The natural region may be considered as bounded inland by the lofty crest of the Sierra Nevada. Along the coast runs the Coast Range; between the Sierra Nevada and the Coast Range is the great valley of California. The valley is drained by two rivers—the Sacramento in the north and the San Joaquin in the south. The Coast Range has been broken through at one point, giving access to the valley from the Pacific Ocean. Guarding this gap is the great port of San Francisco. The Coast Range gets a good rainfall and suffers considerably from fogs, but the valleys are sheltered and dry. Large tracts are now irrigated and used for fruit farming. Wheat and barley and rice are grown, but California is famous for its fruits, and the fruit-drying and fruit-canning industry is an important one—peaches,

apricots, pears, plums, cherries, etc., are all grown and tinned, whilst large numbers of raisins are dried. Equally important are the fresh "citrus" fruits—oranges, lemons, and grape-fruit—which are sent to all parts of North America. Olives are grown. *Sacramento* is

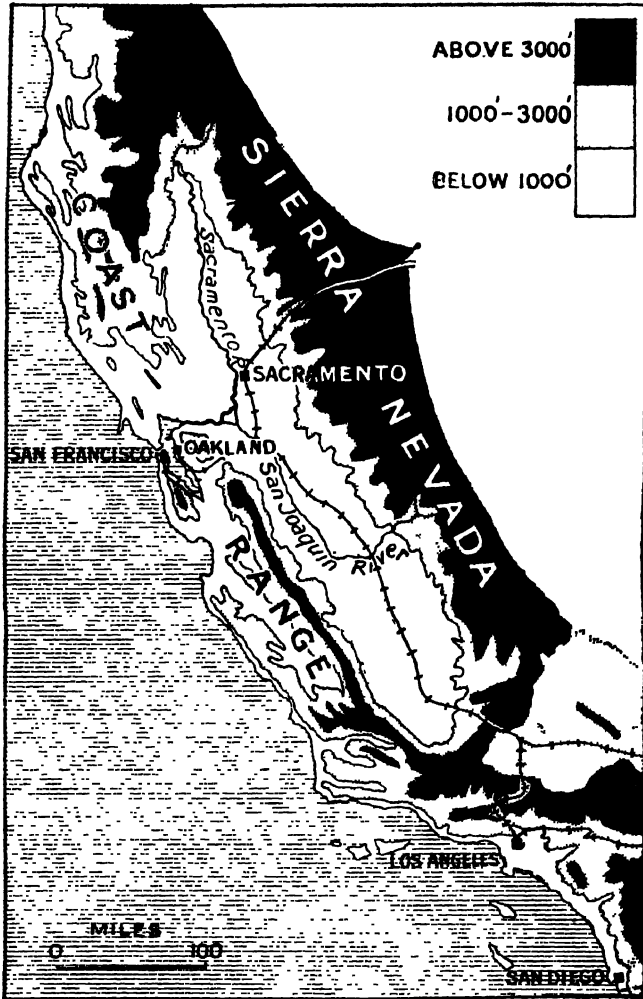


FIG. 262.—The Mediterranean region of America (California).
Notice that only one railway goes directly eastwards from San Francisco across the Sierra Nevada.

an important town in the valley, but far larger is *San Francisco*. In the South of the region are some of the largest oilfields in the United States, centring round the town of *Los Angeles*. This area alone produces nearly a sixth of all the oil obtained in the world. *Los Angeles* is also the centre of the moving-picture industry, an

industry which has grown with amazing rapidity to be amongst the most important in the States. Los Angeles is now larger than San Francisco. Notice the two main railway lines which connect California with the eastern states. They start from Oakland, opposite the port of San Francisco.

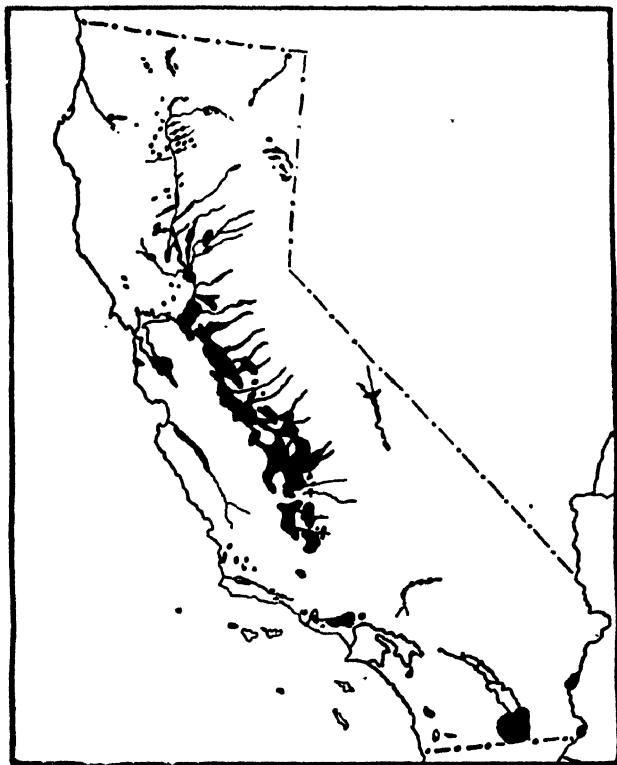


FIG. 263.—Irrigated land in California (shown in black).

ALASKA

The large territory of Alaska was purchased from Russia in 1867 for \$7,200,000. The annual value of Alaskan products now approaches \$100,000,000. About two-fifths of the area is composed of mountains, large areas are forested, but the forests are not of particular value. Its wealth lies in its fisheries—salmon and seal—and in its minerals, notably copper and gold, though the famous goldfields of the Yukon and Nome appear to be now nearly worked out. The herds of reindeer may be an important source of wealth. Introduced by the Government some years ago, they have increased at an amazing rate and now number a quarter of a million. Reindeer meat is supplied regularly to American cities. The climate is too rigorous for agriculture ever to become really important.

MEXICO

Mexico is a large republic, with an area of about 767,000 square miles, and a population of fourteen millions. Mexico was a colony of Spain from 1521 to 1822, and most of the inhabitants are descended from Spanish settlers and from the native American Indians. The country is very unsettled, and there have been many revolutions within the last hundred years.

Mexico consists of a broad high plateau, a continuation of the Rocky Mountain Plateaus of the United States, with a coastal plain on either side. On the west is the long mountainous peninsula of Lower California, in the south-east is the lowland peninsula of Yucatan. The Tropic of Cancer runs right through Mexico, so the coastal plains are hot and enjoy a good rainfall. The slopes of the plateau are cooler, but attract a good rainfall. But the surface of the plateau is 4,000 to 8,000 feet above sea-level and sheltered from the influence of the sea. The days are hot and the nights cold ; there is a great difference between summer and winter. The plateau gets particularly hot when the sun is overhead and a small monsoon is caused, bringing rain from east and west in the summer. Lower California is in the desert belt and remains dry.

The Tropical Coastlands are suitable for cane-sugar, rubber, vanilla, and tobacco, and in settled times good crops are obtained. Sisal hemp comes from Yucatan.

The Temperate Hill Slopes produce good coffee and large quantities of maize, which is the staple food of the people. Where the rainfall is poor, small tracts are irrigated.

The Plateau usually suffers from poor rainfall, and irrigation is usually needed for cotton, wheat, and maize. Many sheep and cattle are reared.

Mexico is famous for its mineral wealth. Mexico produces nearly half the world's silver and huge quantities of copper. There are also deposits of iron and coal. These minerals come from the plateau, especially near *Mexico City*. On the flanks of the mountains are the famous oilfields which were first worked about 1910. But Mexico produces now only $2\frac{1}{2}$ per cent. of the world's supply (1935). *Tampico* is the great oil port. Mexico has not yet developed many industries. Hydro-electric power is available, and a few cotton goods are made at *Vera Cruz*. Mexico is the largest city, capital of the republic, and near the important silver-mining regions.

CENTRAL AMERICA

Central America consists of the six small republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, and Panama, with the British Colony of Honduras. A broad backbone of mountains

runs through the countries; it narrows gradually to a single chain in the Isthmus of Panama. There is a narrow coastal plain on either side of the mountains. The rainfall on the Atlantic side, being derived from the Trade Winds, is heavier than on the west. As in Mexico, it is possible to distinguish:

- (a) Tropical plains, producing sugar, bananas, coconuts, and hard timbers.
- (b) Temperate hill slopes, producing coffee.
- (c) Cool grass-covered highlands.

As in Mexico, the inhabitants are of Spanish-Indian descent.

The Republic of Panama occupies the narrowest part of the isthmus between North and South America. Many years ago the

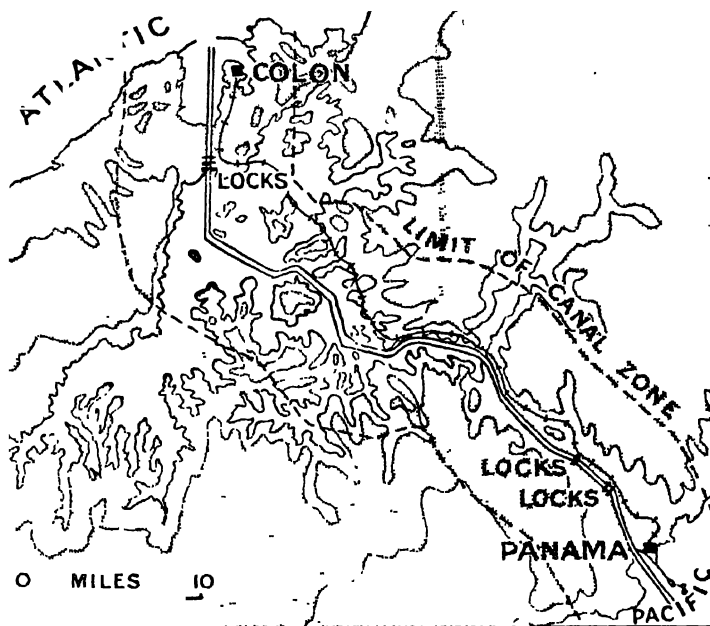


FIG. 264.—The Panama Canal.

Land over 300 feet, heavily dotted; land below 300 feet, lightly dotted. Notice the hilly nature of the Isthmus, the curved course of the canal, and the three locks at each end.

Frenchman (De Lesseps) who built the Suez Canal tried to construct a canal across the Isthmus of Panama, but he failed. In 1904 the United States purchased a strip of land ten miles wide from Panama and spent \$500,000,000 in building the Panama Canal. The canal was finished in 1914. The canal belongs to the United States, but it may be used by vessels of all nations on equal terms. In 1930-31 over 5,500 ocean steamers went through the canal, mostly

American and British. The canal is about 36 miles long, but for more than half the distance it runs through an artificial lake. The Panama Canal was much more difficult to construct than the Suez. The Suez Canal passes through flat land, but the Panama Canal has to cross a ridge of hills. This it does by means of locks. The town at the northern or Atlantic end is *Colon* : at the southern or Pacific end is *Panama*.

The Panama Canal is of great importance to the United States because it allows ships to ply between her west coast ports and her east coast ports, and the whole American fleet could quickly be transferred from the Atlantic to the Pacific Ocean or *vice versâ*. Notice, too, how it facilitates trade between the busy manufacturing states round New York, and the South American countries of Chile and Peru. The canal affords Australia and New Zealand an alternative route to Europe which is now largely used.

THE WEST INDIES

The West Indies consist of four large islands and a large number of small ones. Nearly the whole of the group lies within the Tropics.

Cuba is a republic in subordinate alliance with the United States and has been greatly developed by that country. So that now Cuba produces one-third of the world's supply of cane-sugar. The sugar is exported largely to the United States and Europe. Cuba is also famous for its tobacco, exported from the capital and principal port of Havana.

Porto Rico is a much smaller island, belonging to the U.S.A., and again sugar-cane and tobacco are the leading products—together with some coffee.

Haiti (or Hispaniola) is divided between two Negro republics—the Negroes being the descendants of liberated African slaves. Both republics are very undeveloped.

Jamaica, part of the British Empire, is famous for its cane-sugar and bananas, which are exported through the ports of Kingston, Montego Bay, and Port Antonio.

The smaller islands of the West Indies, known as the "Lesser Antilles," belong mostly to the British Empire, though some are French. They nearly all produce cane-sugar, some limes, and sea-island cotton. The island of Trinidad really belongs to South America and produces large quantities of mineral oil and pitch. The pitch is obtained from the famous "pitch lake," and it is valued for "tarring" metalled roads. Although such a small island, Trinidad produces over 300,000,000 gallons of oil annually.

EXERCISES

1. A Census of nearly all countries in the British Empire is taken every ten years, the next being due in 1941. Keep up to date the population table for Canada from the *Canada Year Book*, or *Statesman's Year Book*.
2. Mineral Production of Canada. Keep Fig. 212 up to date from the same sources.
3. Forest Products of Canada. The latest information will be found in the *Canada Year Book*.
4. Agriculture in Canada. The Tables should be completed from the *Canada Year Book*. A figure corresponding to Fig. 217 is published annually and care should be taken to notice important changes.
5. The Foreign Trade of Canada. Figs. 220 to 224 should be kept up to date from the *Report on the Balance of Trade* (League of Nations) or the sources mentioned above.
6. The next Census of the United States will be in 1930. Complete table from *Statesman's Year Book*.
7. Mineral Production of United States. Keep Fig. 232 up to date.
8. Agriculture in United States. Keep the tables up to date from the *International Year Book of Agricultural Statistics*.
9. Primary Production table. From the *Statesman's Year Book*.
10. The Foreign Trade of the United States. Figs. 252 to 256 should be completed from the *Report on the Balance of Trade*. Care should be taken to secure figures dealing with calendar years.

EXAMINATION QUESTIONS

1. Name the parts of Canada which produce wheat for export, and discuss in detail the favouring conditions. (*Univ. London Inter. B. Com.*, 1925.)
2. Give an account of the iron and steel industry of U.S.A. (*Univ. London Inter. B. Com.*, 1925.)
3. Give a general geographical account of the cotton lands of the U.S.A. (*Univ. London Inter. B. Com.*, 1927.)
4. Draw a map of either the Appalachian or the Cordilleran mountain systems of North America, bringing out clearly the important barriers and passage-ways. (*Univ. London Inter. B.Sc. (Econ.)*, 1926.)
5. Show from the *Canada Year Book* statistics in what lines manufacturing development has been greatest in Eastern Canada since 1900. (*Univ. Toronto, 1st Year Hons.*, 1927.)
6. Discuss the connection between the railways of Canada and the distribution of the population. (*Univ. Oxford Dipl.*, 1926.)
7. "For her forests alone Canada is an invaluable asset of the Empire." Comment on this statement. (*Univ. Oxford Dipl.*, 1926.)
8. Estimate the capacity of Canada to furnish for export food products other than wheat. (*Univ. Oxford Dipl.*, 1926.)
9. Describe the climate of the Canadian prairies and its control of human life and activities. (*Univ. Oxford Dipl.*, 1926.)
10. Give an account of the sources and use of hydro-electric power in the eastern provinces of Canada. (*Univ. Oxford Dipl.*, 1926.)
11. Either, Write a concise geographical account of Newfoundland, and compare it summarily with Vancouver Island.
Or, Compare the highland areas of eastern and western Canada. (*Univ. Oxford Dipl.*, 1926.)

12. Describe Canada's position with regard to the world's lumber reserves. From your discussion, what legislation would you recommend? (*Univ. Toronto, 1st Year Hons., 1927.*)

13. Trace the history of the dairy industry in Canada, showing clearly the important factors in its development. (*Univ. Toronto, 1st Year Pass, 1925.*)

14. What do you predict as to the general tendencies of Canada's export trade in the immediate future? (*Univ. Toronto, 1st Year Pass., 1925.*)

15. Discuss the position of Canada in relation to the world's food supply. (*Univ. Toronto, 4th Year Hons., 1927.*)

16. Discuss the economic prospects of the so-called Barren Grounds and the northern archipelago of Canada. (*Univ. Oxford Dipl., 1925.*)

17. Write a geographical account of the Lake Peninsula of Ontario. (*Univ. Oxford Dipl., 1925.*)

18. Estimate the importance of the distribution of the water-power resources of Canada for the industrial development of the country. (*Univ. Oxford Dipl., 1925.*)

19. Good natural harbours are plentiful on the coasts of British North America, but ports with considerable trade are few. Explain the reasons. (*Univ. Oxford Dipl., 1925.*)

20. Examine, concisely, the geographical factors affecting the development of trade in the Gulf ports of U.S.A. (*Univ. London B.A. Hons., Econ. Geog., 1927.*)

21. Summarize the economic geography of the Sacramento Valley (Cal.). (*Univ. London B.A. Hons. Econ. Geog., 1927.*)

22. Discuss, in relation to temperate North America, the part played by water-routes in determining the location and growth of great towns. (*Univ. London Inter. Arts, 1927.*)

23. Write a brief essay on "The Mineral Wealth of the United States of North America." (*Univ. London Inter. B.Sc., 1928.*)

24. Give an explanatory account of the distribution of forests in Canada. (*Univ. London Inter. B.Sc., 1928.*)

25. Analyse the location of the chief centres of iron and steel manufacturing industries in the United States. (*Univ. London Inter. Arts, 1928.*)

26. Outline the physical features common to West Indian islands; illustrating your answer by reference to particular islands or groups. (*Univ. London Inter. Arts, 1928.*)

27. Divide into natural regions that part of Canada which lies east of the Rocky Mountains, and point out the chief contrasts in the economic development of these regions. (*Univ. London Inter. Arts, 1928.*)

28. Compare and contrast the position, trade and industry of San Francisco with those of any typical eastern port of the United States. (*Univ. London Inter. Arts, 1928.*)

29. Supposing the American Cordillera to be divisible into four parts, (a) north of Mexico, (b) between southern U.S.A. and the Knot of Pasto (Ecuador), (c) between the Knot of Pasto and southern Chile, and (d) the extreme south, describe the outstanding relief features that distinguish each of these from the others. (*Central Welsh Board, Higher Cert., 1927.*)

30. Discuss the division of the prairie land of North America into natural regions. (*Central Welsh Board, Higher Cert., 1927.*)

31. Compare and contrast the climates either of Nova Scotia and Southern British Columbia, or of California and Florida, giving indications of relations of climate to vegetation for each of the regions you select. (*Central Welsh Board, Higher Cert., 1927.*)

32. Discuss either the mineral resources of the Dominion of Canada, or the economic possibilities of Central America. (*Central Welsh Board, Higher Cert., 1927.*)

CHAPTER XVI

SOUTH AMERICA

GENERAL CONSIDERATIONS

Position and Size.—South America has an area of roughly 7,000,000 square miles. The equator passes through the mouth of its greatest river, the Amazon; and the Tropic of Capricorn roughly bisects the distance between the north coast and Cape Horn. But the whole continent is wedge-shaped, tapering southwards, so that more than two-thirds of its area lies within the tropics. The position of the meridian of 60° W. should be noted.

Physical Features.—With the exception of Africa, South America is the continent which has the least indented coast and consequently the shortest coastline in proportion to its size. The continent can be divided into a small number of well-defined physical units, closely comparable with those of North America. These are :

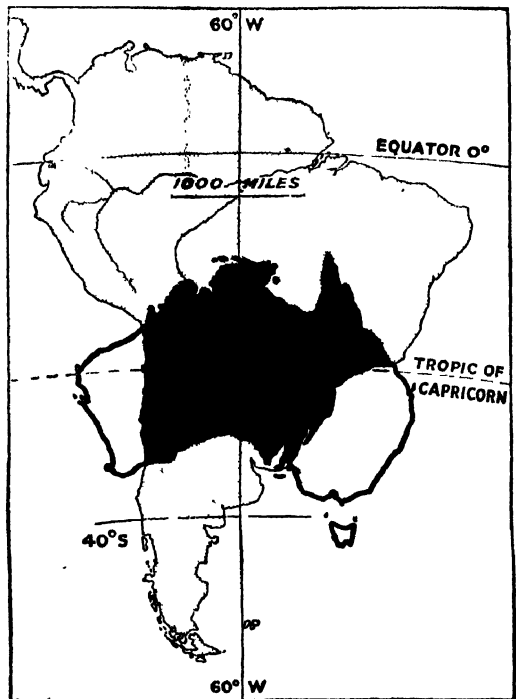


FIG. 265.—The position of South America.
Australia is placed in the same position relative to the Tropic of Capricorn.

(1) The Western Mountain System consisting of the fold ranges of the Andes. In the north there are several ranges separated by river valleys. Further south the system is broader,

and includes a broad, lofty plateau, but the whole system narrows to one main range in the south. The close comparison with the western mountain system of North America should be noted. There is usually a narrow coastal plain bordering the Pacific Ocean.

(2) The Central Plains, which are much more of the nature

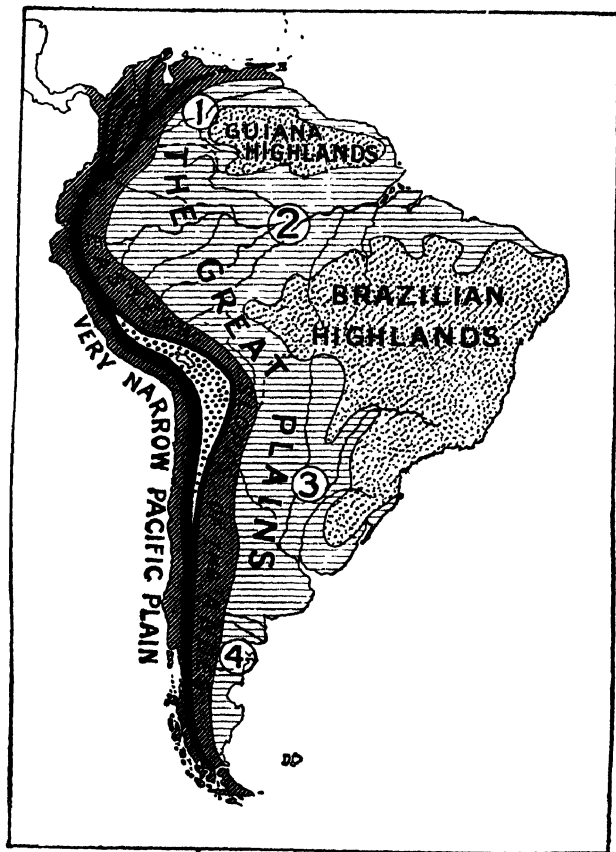


FIG. 266.—The main physical features of South America.

1 = The basin of the Orinoco; 2 = the basin of the Amazon; 3 = the basin of the Parana and Paraguay Rivers; 4 = the Argentine Pampas and Patagonian Desert.

of true lowlands than the Central Plains of North America, may be conveniently divided into four units :

- (a) The Orinoco Basin (with the Llanos or grassy plains).
- (b) The great Amazon Basin (with the Selvas or Equatorial Forests).
- (c) The basin of the Parana—Paraguay Rivers.
- (d) The Argentine Pampas and Patagonian Plateau.

(3) The Eastern Highlands, consisting of two large areas of old crystalline rocks separated by the Amazon River. The two plateaus are the Highlands of Guiana and Venezuela in the north and the Highlands of Eastern Brazil in the south.

Rivers.—There are five important river systems in South America ; one corresponding to each of the divisions of the Central Plains and a fifth system—that of the Cauca and Magdalena—draining the northern ranges of the Andes. In a continent as undeveloped as South America the rivers, as might be expected, are of great importance as highways. The Cauca, Magdalena, and Orinoco are all navigable by river steamers, whilst the Amazon and its tributaries form a network of highways of first-class importance. Ocean liners can ascend the Amazon to Manaos, 1,000 miles from the mouth, river steamers can penetrate to the foothills of the Andes. On the Madeira navigation is interrupted by rapids and a railway has been

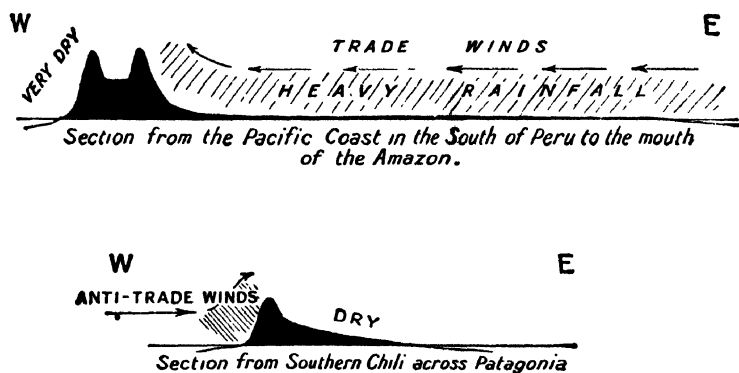


FIG. 267.—Sections across South America from west to east.

built to link up the navigable stretches. It is safe to say that over much of the Amazon Basin, owing to floods, railways and roads will never be possible, and the rivers will remain the great arteries of the country. The Parana-Paraguay system is navigable as far north as Asuncion by steamers of considerable size.

Geology.—The close comparison which can be instituted between the continents of North and South America from the point of view of their physiography is also possible from the point of view of geological structure. The eastern plateaus, consisting of ancient rocks, are comparable with the Laurentian Shield and, like the latter, are highly mineralized in places. Apart from the gold and diamonds of the Guiana Highlands and the iron-ore, copper and diamonds already obtained from the Brazilian Highlands, the mineral potentialities of the latter area, in particular, are immense. The Andine system is closely comparable with the Rocky Mountain system and valuable deposits of silver, copper, tin, and other metals

occur, especially in the high plateau of Bolivia. As in North America, important oil fields occur on the flanks of the western mountain system in Venezuela, Colombia, Peru, and Argentina. South America is, however, deficient in coal. The Pacific coastal strip has a curious mineral industry made possible by its dry desert climate—the nitrate industry of Northern Chile.

Climate.—The climates of South America are controlled to a great extent by its physical features, but especially by the great chain of the Andes. In the northern two-thirds of the continent

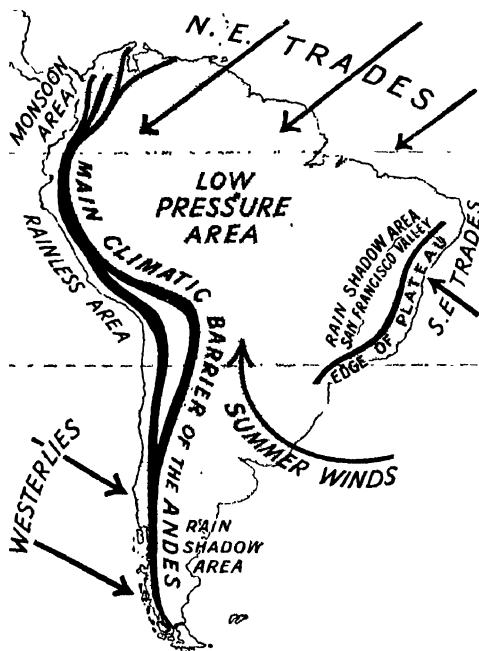


FIG. 268.—The mountain ranges and regular winds of South America.

Compare this map very carefully with the rainfall map.

the rain-bearing winds are the Trade Winds—blowing from the north-east and south-east. The Andes entirely prevent these winds from reaching the Pacific. There we find the curious feature of a long, narrow, almost rainless desert bordering the ocean. The winds are actually on-shore, but blow from over the cold Humboldt Current (see Fig. 269) and are warmed when they reach the land and do not deposit moisture. The southern third of the continent is under the influence of the North-Westerlies, which bring abundant rainfall to the southern part of the Pacific Coastal Strip, but which are prevented

by the Andes from crossing to the eastern side of the continent. So here in the south we find desert again, but this time on the Atlantic side of the Andes—the Patagonian Desert. The Mediterranean Region naturally lies on that part of the west coast, southwards from Valparaiso, which is under the influence of the moist westerlies or Anti-Trade Winds only in Winter.

January Conditions.—At this season the sun is shining vertically over the Tropic of Capricorn—that is, over the heart of South America, and the belt of greatest heat is over the southern part of the Amazon lowlands. The Trade Winds flow in towards this area

and give rise to a heavy summer rainfall. At this season of the year the west coast is cooler than the east coast owing to the influence of the cold Peruvian current.

July Conditions.—As shown in Fig. 270, the belt of greatest heat has shifted to the north of the continent, but again the influence of the cold current on the west coast is to be noticed.

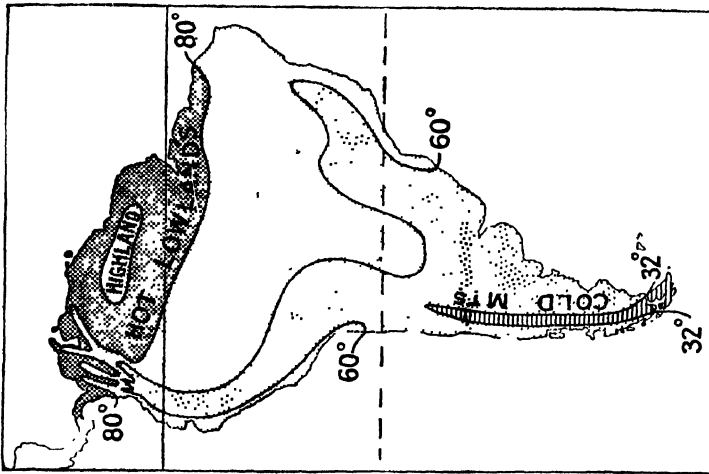


FIG. 270.—South America—July conditions (cold season south of the Equator).

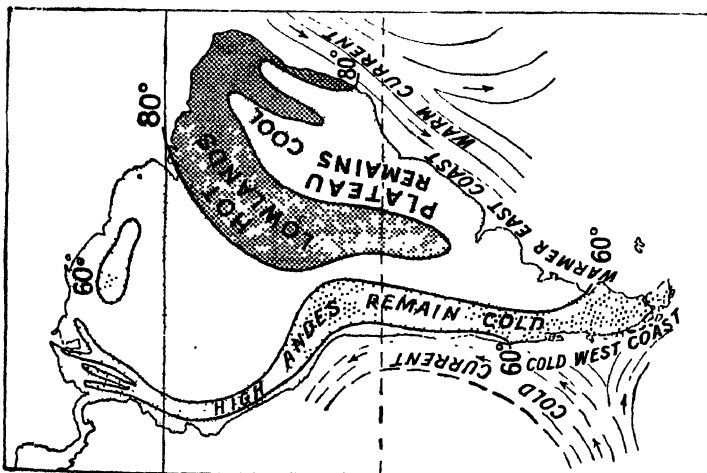


FIG. 269.—South America—January conditions (hot season south of the Equator).

Fig. 271, showing the rainfall of South America for the whole year should be self-explanatory. The equatorial belt of convectional rainfall is particularly well marked. The reasons for the dryness of the central strip of the Pacific Coast and of Patagonia should be noted (Fig. 268). The dry patch in the north-east of Brazil lies in the São Francisco valley—in the rain shadow of the edge of the

plateau. The heavy rainfall on the north-west coast, as in Mexico, is mainly the result of a local monsoon.

Natural Vegetation.—The natural vegetation of South America is relatively simple in its arrangement. The hot, wet lowlands of the Amazon Basin and the coastal plain are covered with very dense Equatorial Forests. The Amazon Basin is the largest area of Equatorial Forest in the world. The plateaus lying in the Tropics (Plateaus of Guiana and Brazil), as well as a large part of the Orinoco Basin, are occupied by Tropical Grasslands, or

Savanas. The grasslands of the Orinoco have received the special name of Llanos. South of the Brazilian Highlands are warm Temperate Forests, passing into the Temperate Grasslands of the Argentine, which in turn become drier and pass into the Temperate Desert of Patagonia. On the west of the Andes a hot desert occupies the rain-shadow area in the Tropics. South of this is the small area of Mediterranean vegetation, which in turn passes into Cool Temperate Deciduous Forests. Follow all these points carefully in Fig. 272.

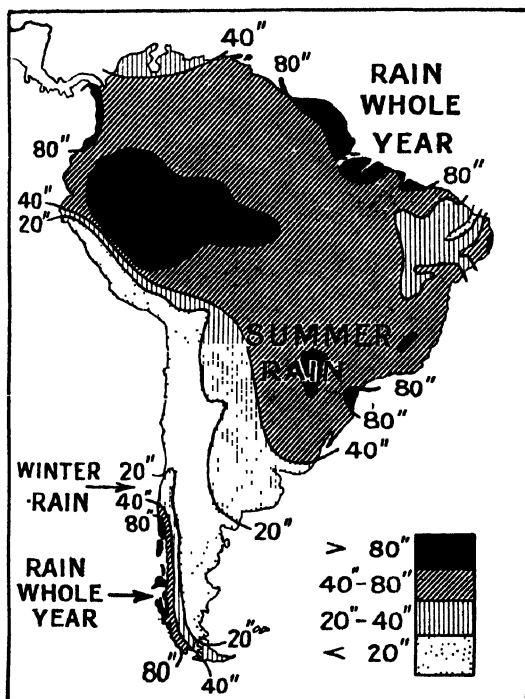


FIG. 271.—Rainfall map of South America for the whole year.

Natural Regions.—Combining what has been said concerning the major physiographical regions, the climate, and vegetation, South America may be divided into “natural regions.” As with the regional divisions under which the geography of the United States was described, sometimes physical features, sometimes climate, and sometimes other features determine the separation of the region (see Fig. 273).

(1) **Natural Regions of the Pacific Coastal Strip.**—

(a) The Monsoon Region of the north-west.

(b) Desert Region in the centre. Great areas of this dry region however yield large quantities of nitrate, valued in the

agricultural countries of Europe and North America as a fertiliser. The salt occurs as a crust over or near the surface of the desert. Were there any rainfall it would all dissolve and be washed away. Most of the towns in this dry region are either nitrate ports, or else serve as outlets to mountainous regions behind.

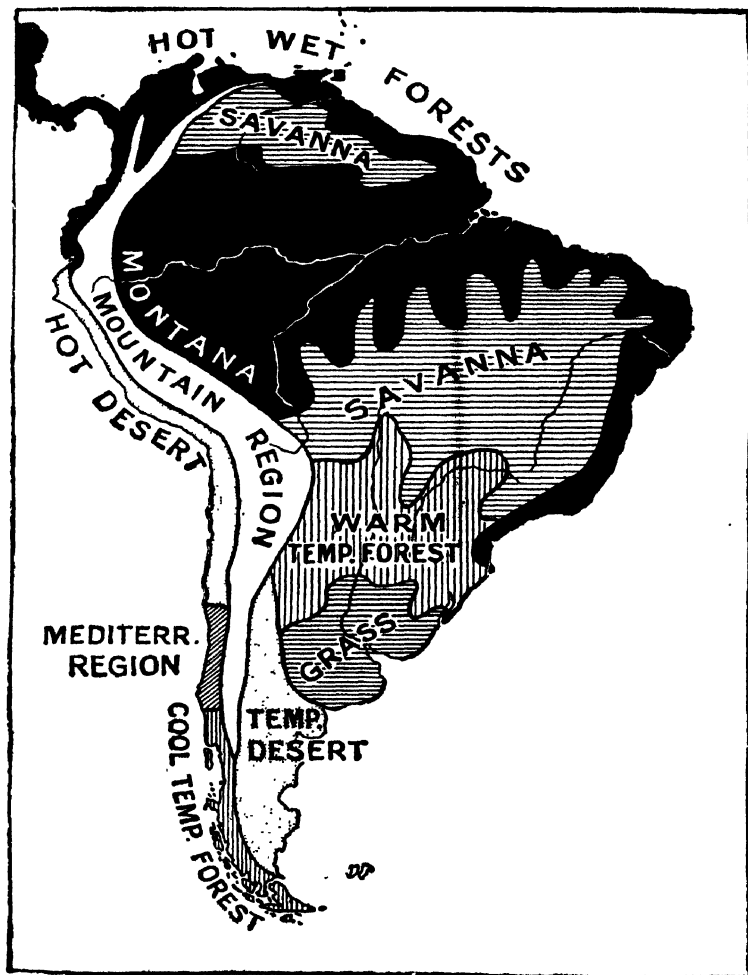


FIG. 272.—The natural vegetation of South America.

(c) The Mediterranean Region. This is a narrow strip southwards from Valparaiso enjoying a Mediterranean climate and having the usual Mediterranean products, but few olives though many cattle and feed crops.

(d) The Cool Temperate Region. This strip enjoys a moderate or heavy rainfall and is covered with forests as yet little exploited.

(2) The Andine Chain.—

(a) The Northern Andes. This portion of the Andine Mountains consists of several parallel chains separated by the fertile valleys of the Cauca and Magdalena.

(b) The broad Central Andes. This region is a lofty plateau chiefly noted for mining.

(c) The narrow Southern Andes. This region acts mainly as a divide between east and west.

(3) The Central Plains.—

(a) The Basin of the Orinoco. This region enjoys a tropical climate, and the natural vegetation is mainly coarse grass: the grassland country is known as the Llanos.

(b) The Amazon Basin. Most of this immense basin falls within the belt of equatorial rain at all seasons, and is clothed with dense Equatorial Forests (Selvas) of huge hard-wood trees. Like similar regions in the same latitudes, it is sparsely populated by backward tribes. It yielded the most important of the rubber-bearing trees, but most of the best trees growing wild have been found and killed by careless tapping, so that the great rubber-



FIG. 273.—The major natural regions of South America.

producing regions of the world are now the plantations of Malaya and Ceylon.

(c) The Basin of the Parana-Paraguay and the Pampas. Part of this region is forested (the Chaco lowlands), but in the lower part it is a land of rich luscious grass on which cattle thrive. To the south, in the Argentine, the grassland (Pampas) is drier and now forms one of the great wheatlands of the world.

(d) The Patagonian Desert. Parts of this region support a few sheep, but the greater part is a dry waste of shingle and sand.

(4) The Eastern Highlands.—

(a) The Highlands of Guiana and Venezuela. This region has great mineral resources, but is little developed owing largely to an unhealthy climate.

(b) The Brazilian Highlands. This region of old crystalline rocks has vast mineral resources. The coastal portion has a rich soil and a tropical climate, ideal for coffee and other tropical products.

Population.—The original inhabitants of South America, when the continent was discovered by Europeans in the fifteenth and sixteenth centuries, were American Indians—some races, like the Incas on the plateaus of Peru, were highly civilized. Most of the Indians remaining are very backward, uncivilized races found in such poorly developed and inhospitable tracts as the dark forests of the Amazon. The civilized nations now inhabiting South America are descended mainly from the Portuguese and Spanish explorers who settled in the country, and Spanish is the usual language over most of the continent except Brazil, where Portuguese is spoken. The Spanish descendants are found on both sides of the Andes, but especially to the west, whilst the Portuguese are mainly on the east. In the northern countries many negroes were introduced for labour in the plantations, whilst of recent years large numbers of European immigrants, especially Italians, have settled in the more temperate lands of the south. For long Brazil, the largest country of South America, was a colony of Portugal, but now, with the exception of the small colonies of British, French, and Dutch Guiana, and the British island of Trinidad, all the countries of South America are independent republics. Notice from the population map that nearly all



FIG. 274.—The population of South America.

Each dot represents 500,000 people. Notice *a*, *b*, and *c*, the three areas of concentration of the population and the reasons for the concentration.

the continent is poorly populated. There are three areas of heavy population: (a) around Valparaiso, which enjoys a productive

Mediterranean climate; (b) that part of the progressive state of Argentina around Buenos Aires where the temperate grassland climate is ideal for wheat and cattle; (c) that part of the coastal lands of the Eastern Highlands where soil and climate favour the growth of coffee, etc. Notice what a splendid example we have of the climatic control of the distribution of population.

The following table is included for reference purposes:



FIG. 275.—Political map of South America.

Note: The boundaries between Ecuador and Peru, and Peru and Chile have recently been revised. That between Bolivia and Paraguay is still disputed.

Country	Area, 1000 square miles	Population, ¹ Millions	Exports, 1927, £ millions	Imports, 1927, £ millions
Brazil	3,285	30.6	97.4 ²	90.7 ²
Argentina	1,153	9.5	201.6	171.3
Chile	290	3.8	42.2	26.8
Venezuela	394	2.4	17.6	14.4
Colombia	441	5.9	24.9	24.3
Ecuador	220	2.0	3.9	1.9
Peru	532	5.5	27.9	17.3
Bolivia	514	3.0	10.2	5.3
Uruguay	72	1.6	20.5	17.4
Paraguay	62	1.0	2.9	2.4
British Guiana	89	0.3	3.5	2.7

¹ Various years 1920-24.

² 1928.

During the world depression of 1930-35 the foreign trade of the South American countries suffered very badly. The 1927 figures have been retained here as expressing the relative wealth of the countries.

ARGENTINA

Position and Size.—The Argentine Republic occupies an area of roughly 1,153,000 square miles, or nearly two-fifths the area of continental United States. The total population was estimated on January 1, 1931, to be 11,442,000. The population is concentrated in the fertile Pampas around Buenos Aires, the capital alone having

a population of over 2,150,000. A quarter of the total population consists of "foreigners"—recent immigrants, mainly of Italian and Spanish origin. With the exception of a small tract in the extreme north, the whole of Argentina lies in the South Temperate Zone, but stretches through a wide range of latitude, in all no less than 40°. Argentinian independence from Spain was declared in 1816, but it was not until 1853 that stable government, with a constitution almost identical with that of the United States, was established. The progress of the Republic in the last few decades has been very rapid, and the discovery of the cold-storage methods of transporting meat has been a potent factor in establishing the importance of

Argentinian foreign trade. The Republic is divided into 14 provinces, 10 territories, and 1 federal district (Buenos Aires).

Physical Features and Geology.—The crest of the Andes or, more strictly, the Atlantic-Pacific water-parting, forms the boundary between Argentina and Chile, so that along its western borders Argentina includes a strip of the Andine chain. Eastwards this gives place to a broad belt of very varied topography and geology which may be called the Sub-Andine belt or the Pampean hinterland, and which includes the foothills of the Andes or the Pre-Cordillera

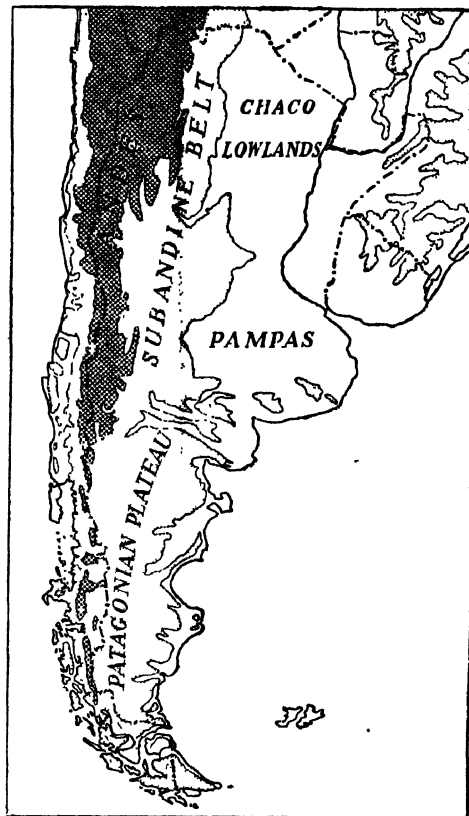


FIG. 276.—Physical map of Argentina.

Land over 500 feet, lightly dotted; over 5,000 feet, dark.

This Sub-Andine belt passes north-eastwards into the swampy-forested Chaco lowlands; eastwards into the flat or rolling grasslands or Pampas; south-eastwards into the Great Plateau of Patagonia. Mining is not of great importance in Argentina. Petroleum is the leading mineral product, and is found in two main areas; around Rivadavia on the coast of Patagonia and on the flanks of the Andine system in the north of the country. Among the varied rocks of the Sub-Andine region, gold, silver, copper, tin, tungsten, and coal are worked, the first four especially in the province of Catamarca.

In 1932 the output of crude oil amounted to 5,600,000 barrels from State oil fields and 7,400,000 barrels from private fields.

The Climate and Natural Vegetation of Argentina.—Reference to Fig. 272 will show that, apart from a strip of the high Andine region with an "Alpine" climate, Argentina falls into three climatic-vegetation regions—the Warm Temperate Forest or Chaco region of the north; the Temperate Continental or Grassland region of the centre, and the Temperate Desert or Patagonian region of the south. In Fig. 272 a strip with a "Temperate Desert" climate is shown stretching northwards to cover the Sub-Andine Zone between the Grassland and the Andes. The climate of this Sub-Andine belt differs in some particulars from that of Patagonia and will be mentioned again in dealing with the natural regions of Argentina.

The forests of the northern part of the republic are of importance as yielding the quebracho wood and quebracho extract used in tanning.

Agriculture.—Out of a total area of 700,000,000 acres, about 250,000,000 acres are classed as suitable for agriculture; 250,000,000 acres as suitable for stock farming; 100,000,000 acres are woodland; 100,000,000 acres arid or mountainous. Of the cultivable portion 10,000,000 acres require irrigation. Despite the rapidity with which arable farming has been spreading at the expense of pastoral farming only about one-fifth of the suitable land is as yet under crops. The following table is for reference purposes:

Crop	Acreage (millions)			Yield (thousands of metric tons)		
	1909-13	1925-26	1933-34	1909-13	1925-26	1933-34
Wheat	16.1	19.0	19.1	4,000	5,200	6,972
Maize	8.7	10.7	14.5	4,870	7,090	6,700
Oats	2.4	3.0	3.5	787	1,170	844
Linseed	—	5.8	6.6	—	1,900	1,337
Sugar	—	0.24	0.35	176	396	313
Vine	0.27	0.28	0.32	—	—	—
Cotton	0.01	0.27	0.33	1.5	68	125
Tobacco	0.02	0.02	0.03	5.7	9.3	13.4

Animals	Millions		
	1914	1922	1930
Cattle	25.9	37.1	32.2
Sheep	43.2	36.2	44.4
Pigs	2.9	1.4	3.8

Wheat.—Wheat, maize, oats, and flax are all of the greatest importance in the Temperate Grassland region ¹ and so are cattle

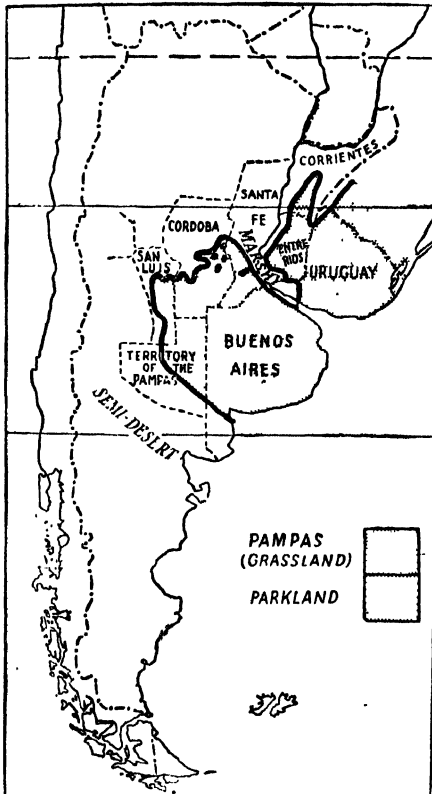


FIG. 277.—The Grasslands of Argentina and Uruguay.

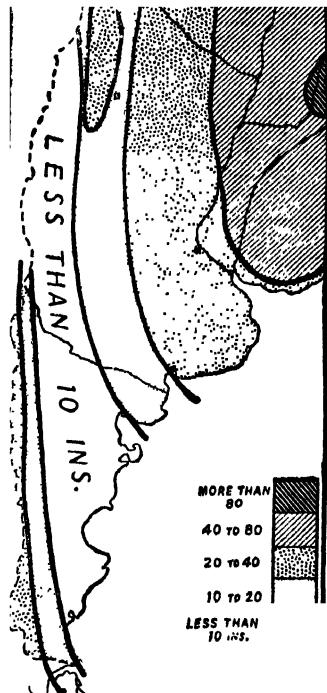


FIG. 278.—The rainfall of Argentina.

and sheep. The importance of each particular crop and its distribution *within* this great region are determined mainly by rainfall. Fig. 277 shows roughly the extent of the grasslands ; Fig. 278 shows

¹ Roughly 90 per cent. of the cereals of Argentina grow in the grassland region.

the rainfall conditions within the belt. It will be seen from Fig. 279 that the great wheat lands lie in the drier and cooler parts of the Grassland belt. Normally about three-fifths of the crop are exported, mainly through the ports of Buenos Aires and Bahia Blanca.

Maize.—By way of contrast with the wheat, the maize belt lies in the wetter and warmer parts of the grassland region. Argentina is the principal maize-exporting country in the world, supplying

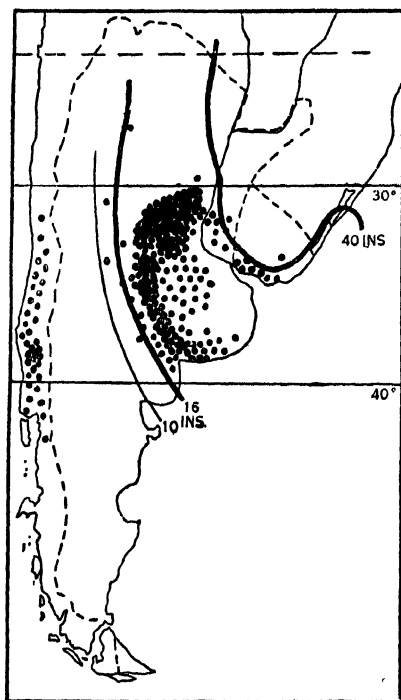


FIG. 279.—The distribution of wheat in Argentina, Chile, and Uruguay.

Each dot represents 1,000,000 bushels (1926-27). In addition to the rainfall lines marked, that for 20 inches passes through the heart of the wheat belt.

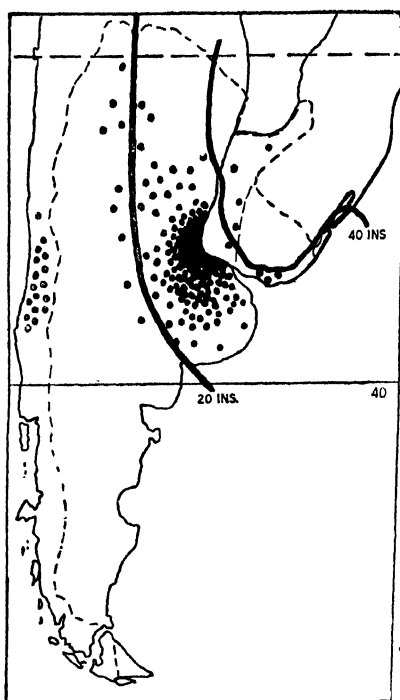


FIG. 280.—The distribution of maize in Argentina, Chile, and Uruguay.

Each dot = 1,000,000 bushels (1926-27). Argentina, 8,150,000 metric tons or 302 million bushels. Nearly all the maize grows in the warmer regions, between the Tropic of Capricorn and 40° S. and where the rainfall is more 20 inches.

more than half the maize which enters into international trade, and averaging over 3·2 million metric tons (1921-25).

Oats are grown almost entirely in the cooler south-eastern parts of Buenos Aires, between Bahia Blanca and Tandil, and again a large proportion of the crop is exported.

Flax is grown mainly for the sake of linseed, and up to 95 per cent. of the crop is exported. It is a crop of unusual importance in Argentina, and grows in the wheat and maize belts. More than

40 per cent. of the linseed entering into international trade is Argentinian.

Sugar cane is grown mainly in the northern part of the Sub-Andine region, including that part of Argentina which lies within the Tropics, and where the abundant sunshine of a dry climate supplies the necessary warmth, and mountain streams from the Andes the necessary moisture. The provinces of Tucuman, Jujuy, and Salta are the sugar-producing regions, the town of Tucuman being the chief centre.

The Vine is also a specialized product of the Sub-Andine region but is found further south than the sugar, chiefly in Mendoza and San Juan with the towns of Mendoza and San Juan as centres.

Cotton has increased rapidly in importance in recent years, so that Argentina ranks after Brazil and Peru as a producer in South America (see p. 164). In 1909-13 the production averaged 637 metric tons; in 1933-34 it was 125,000 tons. Most of the cotton is grown on the fringes of the Chaco lowlands in the north; it has been estimated that land available and suitable for cotton cultivation exceeds the total area of the cotton lands of the United States.

Cattle.—The development of the pampa of the Argentine commenced in earnest about 1870, when sheep rearing began to be undertaken seriously. Cattle rearing, however, remained unimportant so long as the only product suitable for export was the hide. The necessary stimulus to the breeding of cattle for meat was afforded by the establishment of freezing works. Native cattle were graded up by the finest imported cattle—especially Shorthorns and Herefords from England. Natural pasture has given place to alfalfa, which now occupies more than a third of all the cultivated land in Argentina. Of recent years cattle have increased in numbers,

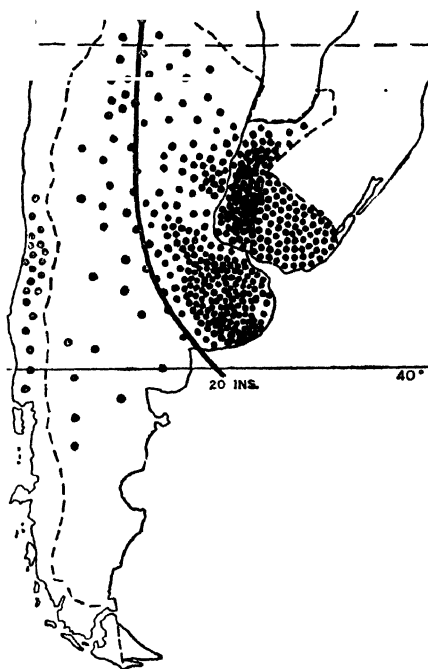


FIG. 281.—The distribution of cattle in Argentina, Chile, and Uruguay. Each dot represents 100,000 cattle. Argentina, 37.1 (1922); Chile, 1.9 (1925), and Uruguay, 8.4 (1925) millions. Contrast with sheep.

outlets of Argentina are Buenos Aires, Rosario, and Bahia Blanca, from which centres the railways may be regarded as radiating. The natural outlet of the maize belt is Rosario, and much of the wheat passes through Bahia Blanca, but apart from this a pre-

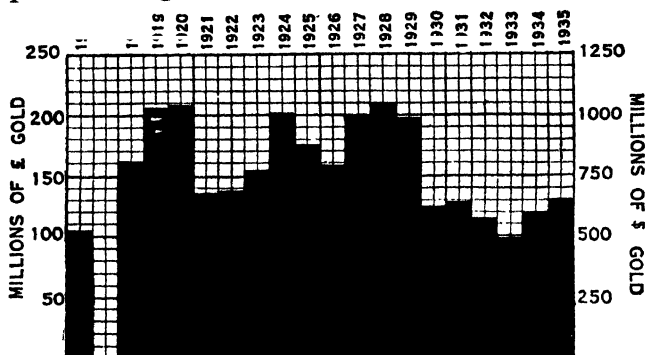


FIG. 284.—The exports of Argentina.

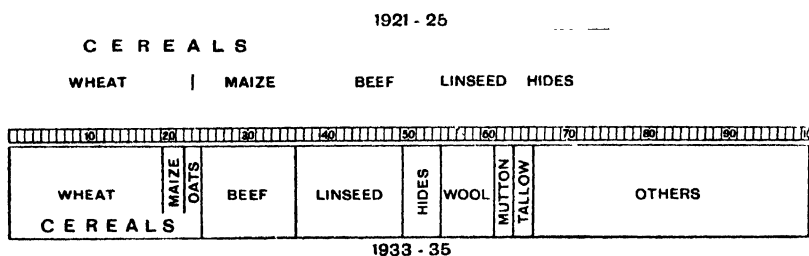


FIG. 285.—The exports of Argentina.

In addition to the exports enumerated, extract of quebracho represents nearly 2 per cent ; sheepskins nearly 1 per cent.

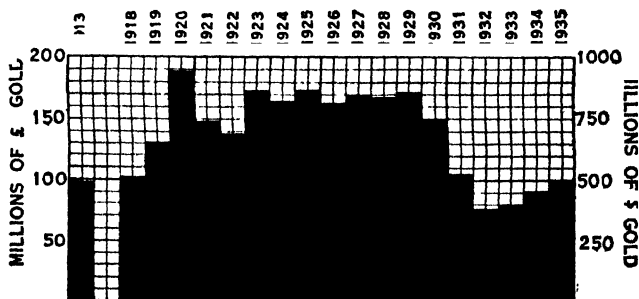


FIG. 286.—The imports of Argentina ("real values").

dominating proportion of foreign trade passes through Buenos Aires. Indeed, the congestion there has recently proved beneficial to such outports as La Plata and Zarate.

Foreign Trade.—Fig. 284 shows the increase in value in recent

years of the exports of Argentina. The principal items are shown in Fig. 285.

Fig. 286 shows the increase in value of the imports, and Fig. 287 illustrates their character.

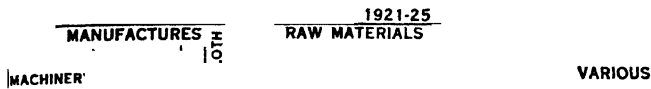


FIG. 287.—The imports of Argentina.

The direction of foreign trade is illustrated in Fig. 288. The importance of the United Kingdom and United States should be noticed, but there is a noteworthy difference in the character of the trade.

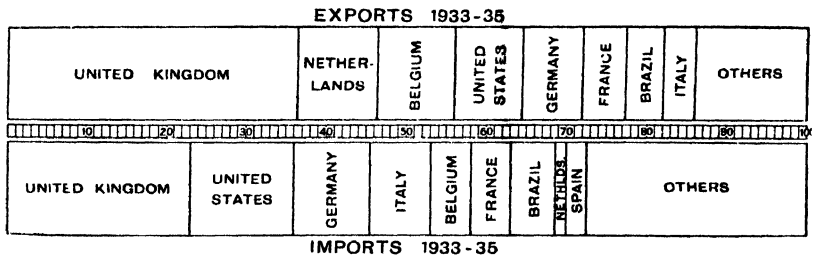


FIG. 288.—The direction of the foreign trade of Argentina.

THE NATURAL REGIONS OF ARGENTINA

The Chaco Lowlands.—The name Chaco (a hunting ground) is applied to the broad stretch of swampy, forest-covered, alluvial plain which occupies the north of Argentina (as well as the neighbouring parts of Bolivia and Paraguay) from the foothills of the Andes on the west to the Paraguay River on the east. During the rainy summer, huge lakes and swampy areas are formed, the rivers have ill-defined courses which change from year to year. Yet in the long dry season the utmost difficulty is encountered in securing supplies of drinking water. The forest is sometimes dense, but generally rather open and broken by tracts of savana and marsh. Varying greatly from place to place, the characteristic forest is the quebracho forest, though the area where true quebracho is cut for tanning materials is limited. Its remoteness, its inaccessibility, the difficulties of water supply, the plagues of insects, and the

hostility of the sparse Indian population have combined to hinder settlement and limit exploration of this vast region. Quebracho cutting is pursued along the belt near the Paraguay; agriculture has made some progress along the southern margins between Santa Fé and Tucuman; cattle-rearing in the strip near the Andine foothills, but otherwise this large area is still very undeveloped. Its potentialities are immense.

The Pampa.—The Argentine Pampa covers an area of a quarter of a million square miles, occupying a semicircle with Buenos Aires as centre, and a radius of 350 to 400 miles—stretching thus to Santa Fé in the north, to Cordoba and S. Luis in the west, and to the coast south of Bahia Blanca in the south. Except for the ranges in the west in Cordoba, and the hills of south-western Buenos Aires the whole of the pampa lies below 500 feet. The greater part appears to the eye dead level. The natural vegetation is, of course, grass, and the landward limit is defined by the transition into scrub or forest—approximately on the west along the rainfall line of 16 to 17 inches. Much more equable than the grasslands of the Northern Hemisphere, there is a general absence of severe frosts in winter, and of extreme heat in summer, but over most of the pampa there is the spring or early summer rainfall maximum which favours the growth of grass and cereals. The soil, too, is a deep stoneless loam, the pristine richness of which is being maintained by the extensive cultivation of alfalfa or lucerne, a plant capable of fixing atmospheric nitrogen and so enriching rather than impoverishing the soil. Details have already been given of the agricultural and pastoral industries of the pampa. With no mineral deposits, not even lime or building stone, and no fuel, the pampa is likely to remain for many years one of the most exclusively agricultural areas in the world.

With the exception of the Parana and Uruguay there are no navigable rivers; indeed much of the drainage of the pampa is, in part at least, underground. The life of the region, therefore, depends upon the railway network. It may be noted that the province of Buenos Aires embraces a very large portion of the pampa; the province of Entre Rios, lying as it does between the Parana and Uruguay, is often called the “Mesopotamian Region.”

The Sub-Andine Region.—The natural region now to be considered forms a strip lying between the lowlands of the Chaco and the Pampa to the east, and the lofty Andes to the west. It consists for the most part of mountain or hill ranges separated by deep valleys, but is very varied in character. The region may be considered as extending southwards to about the valley of the Rio Colorado (lat. 37° S.), further south it fades into the Patagonian Plateau. The whole region is arid; nearly the whole has a rain-

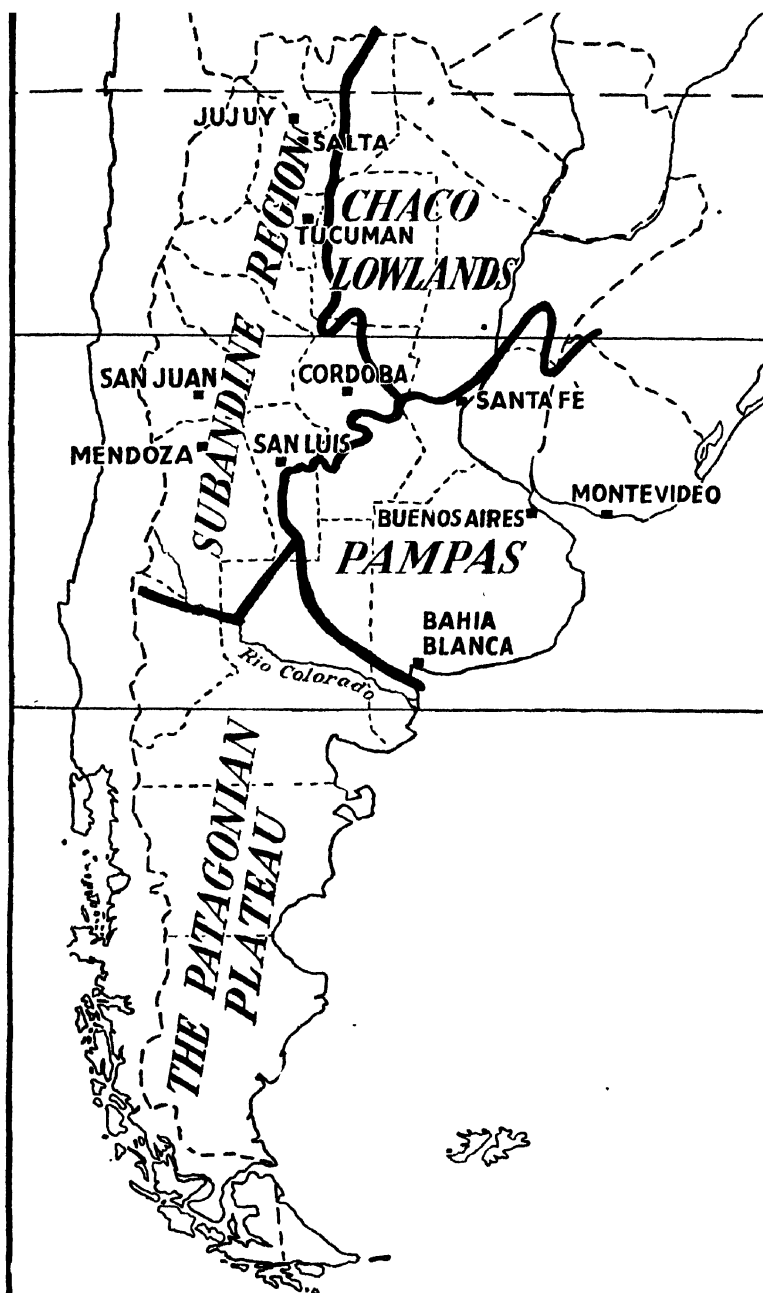


FIG. 289.—The natural regions of Argentina.

fall of less than 16 inches—towards the north mainly in summer as on the Chaco lowlands. Irrigation is of supreme importance, and nearly all settlements exist where the rainfall can be supplemented. The natural vegetation is varied, but scrub and dry forest predominate. The three industries of the region are stock-rearing, agriculture, and mining. Cattle are reared on the scanty scrublands, and fattened on valley-grown lucerne: the sending of the cattle to the Buenos Aires meat works recalls the state of affairs existing in North America where the cattle from the western ranches are sent into the corn belt for final fattening before slaughter. The Argentinian goat-rearing industry is a comparatively recent development on these dry lands: the chief products are the skins. Agriculture throughout the region is concerned mainly with the growing of wheat and maize for local consumption, but the large-scale production of sugar and wine in the north-central and south-central portions of the belt, as already mentioned, should be noted. Though minerals are widely distributed, mining is relatively unimportant. Mendoza, San Juan, Tucuman, Salta, and Jujuy are centres worthy of note: their railway communications should be carefully studied.

The Patagonian Plateau.—Argentina south of the Rio Colorado consists for the most part of an arid plateau organized into five territories. There is little or no coastal plain except near the mouths of the larger valleys, the whole country is built up of a series of plateaus ranging in height from 1,000 to 3,000 feet above sea level. Geologically the plateaus consist of horizontal or slightly inclined strata resting on igneous and metamorphic rocks, and a marked trough often separates this area from the folded rocks of the Andes. Thus, three parallel strips may be separated—the coastal, the plateau, and the trough. The scanty rainfall comes mainly in winter from winds which find their way across the Andes from the Pacific; hence it is the western edge of the plateau nearest the Andes which is best watered and affords the best sheep pasture. Less than 150,000 people live in Patagonia, and many of these are on the irrigated settlements along the Rio Negro, but nowhere in the world is the proportion of sheep per head of population so high as in parts of Patagonia. In Tierra del Fuego it is said to reach 400 per inhabitant. As the sheep are crowded out by grain and cattle in the pampa, so the Patagonian plateau becomes more and more the great sheep-rearing region of Argentina.

PARAGUAY

Paraguay is a small republic, mainly between the Parana and Paraguay Rivers, and in the same region of unhealthy tropical forest as the northern part of Argentina, but touching on the east the

grasslands of the Brazilian Plateau. The grassland is by far the most important part of the country and is suitable for cattle. Maté, or Paraguay tea, is produced (see Fig. 290). *Asuncion*, on the Paraguay River, is the principal town, and is accessible to ocean-going steamers. The inhabitants of Paraguay are mainly of mixed Spanish and Indian descent.

URUGUAY

This little republic is on the opposite (eastern) side of the La Plata estuary to the rich grasslands of the Argentine. It is equally suitable for cattle-rearing and the production of maize. Meat forms the staple export of the country. The chief town and port is *Monte Video*, from which there are railways to the centres of the meat-chilling industry.

BRAZIL

Position and Size.—The independence of Brazil, formerly a Portuguese colony, dates from 1822, but it was not until after the revolution of 1889 that it became a republic, under the title of the United States of Brazil. There are twenty states, one national territory, and one federal district. The total area of the country is over $3\frac{1}{4}$ million square miles—or more than that of the United States. The population according to the census of 1920 is 30·6 million, including 600,000 Indians. By far the greater part of the country lies in the Tropics, the exception being three important states in the south. Estimated population, 1930 : 40·3 millions.

Physical Features and Geology.—Very broadly, Brazil includes three great units—a portion of the Guiana highlands on the north ; the Amazon basin, and the great Brazilian plateau. As already stated, the first and the third consist of ancient rocks, in some areas richly mineralized. In the southern part of the plateau there are broad stretches of volcanic rock which have given rise to excellent soil. Apart from these three units, Brazil also includes in the extreme west the lower slopes of the Peruvian Andes, and in the south-west a portion of the lowlands of the Upper Paraguay.

Coal, mostly of inferior quality, occurs in the four southern states, but most of the minerals are associated with the old rocks of the heart of the plateau. The average value of gold produced in recent years has been over £500,000 ; huge deposits of iron ore exist especially in Minas Geraes. Manganese occurs in the same state, whilst the bulk of the world's monazite (used in the electrical industry) comes from Bahia and other parts of Brazil. The production of diamonds is less important than formerly, though the

towns "Diamantina" and "Diamantino," on the east and west of the plateau respectively, attest their widespread occurrence.

The Climates and Natural Vegetation of Brazil.—Reference to Figs. 272 and 273 will obviate the need for repetition here. It may be broadly stated that Brazil includes :—

(a) The Equatorial Climatic and forest belt of the Amazon Basin and the coastlands as far as Cape S. Roque.

(b) The Tropical Climatic and savana belt of the northern and major portion of the plateau, in which large local differences result from variations in amount of rainfall.

(c) The Warm Temperate Belt stretches across the southern part of the plateau. The natural vegetation is forest, and this belt includes the coffee-growing region of Brazil.

(d) The Temperate Grassland region is just touched in the south, on the borders of Uruguay.

There is, as yet, but little exploitation of the hard timbers of the equatorial forests, but there has been an important development in the exploitation of soft timber from certain regions of the highlands (notably the pines of São Paulo).

Agriculture.—Brazil is an agricultural country though only 17,000,000 acres out of a total area of 2,100,000,000 acres—about 0·7 per cent.—are cultivated. Three quarters of the cultivated land lies in the states of São Paulo, and Minas Geraes (the coffee states) and Rio Grande do Sul (the maize-pig-cattle state).

Crop	Acreage (millions)			Yield (thousands of metric tons)		
	1909-13	1924-25	19..	1909-13	1924-25	1931-32
Coffee	4·6	5·2		795	874	1,562
Cotton	0·9	1·6		181	262	120
Cocoa	—	—		32	58	92
Maize	7·6	6·2		3,798	4,182	5,084
Rice	—	1·3		45	728	1,048
Sugar	—	—		280	831	937
Tobacco	—	0·2		—	59	85
Rubber (plantation) .	—	—		—	25	17

Animals	Millions		
	1912	1920	1932
Cattle	31	34	43
Pigs	18	16	22
Sheep	11	8	11
Goats	10	5	5
Horses and mules	9	7	9

Coffee.—Brazil grows more than 70 per cent. of the world's coffee, and the crop averages over a million tons. Nearly half the world's total comes from the state of São Paulo alone, where there are more than three million acres under this crop. The volcanic soils of this region, rich in iron, are peculiarly suited to coffee. Most of the coffee is grown at elevations of 2,500 to 6,000 feet, on the upper slopes of the valleys, cereals occupying their floors. Santos and Rio de Janeiro are the two principal exporting centres.

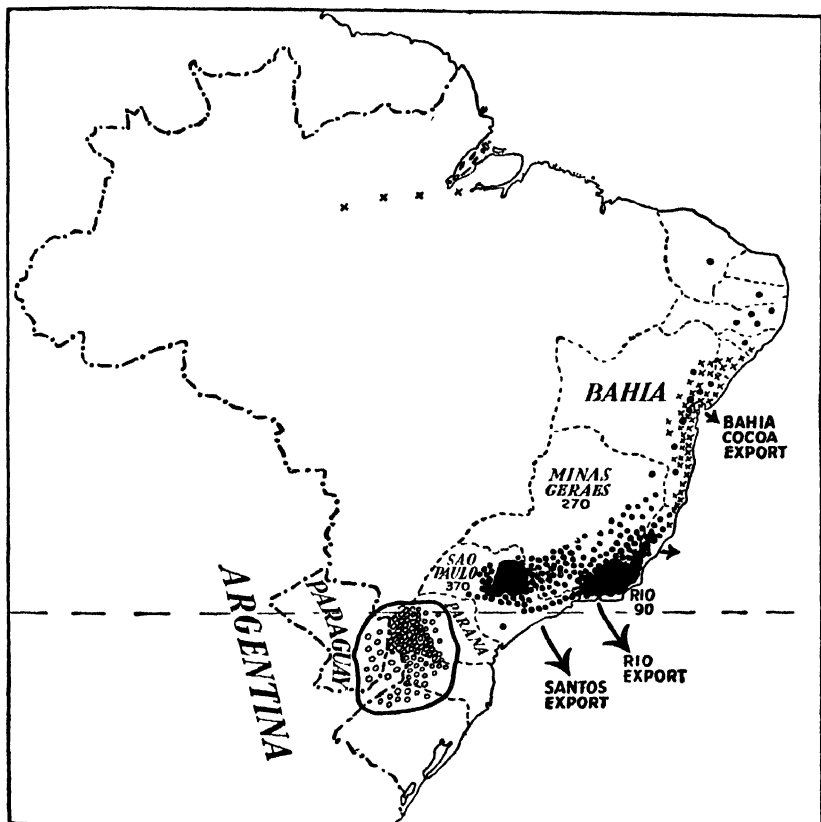


FIG. 290.—The distribution of coffee, cocoa, and maté in Brazil.

Each dot = 1,000 metric tons of coffee (average of 1921–25: 890,000 metric tons); each cross = 1,000 metric tons of cocoa (1921–25, roughly 52,000); each circle represents roughly 1,000 metric tons of maté (maté after *Whitbeck*). Note: less coffee is now grown near Rio, but more in São Paulo.

Cotton.—Out of the million and a half acres under cotton, the state of São Paulo now has the largest share. Here, under climatic conditions approaching those of the United States cotton belt, the annual upland cotton grows well. On the other hand, it is mainly the tree cotton which grows on the hills—between 500 and

2,000 feet—of Pernambuco and Ceara, in the north-east of the plateau region.

Cocoa.—Cocoa is, of course, a product of tropical lowlands, and the chief producing areas are shown in Fig. 290.

Cereals.—It will be noticed from the table that the leading cereal is maize, followed by rice. The temperate cereals are unimportant, and indeed almost throughout Brazil the principal foodstuff is not a cereal at all but tapioca and cassava. Both

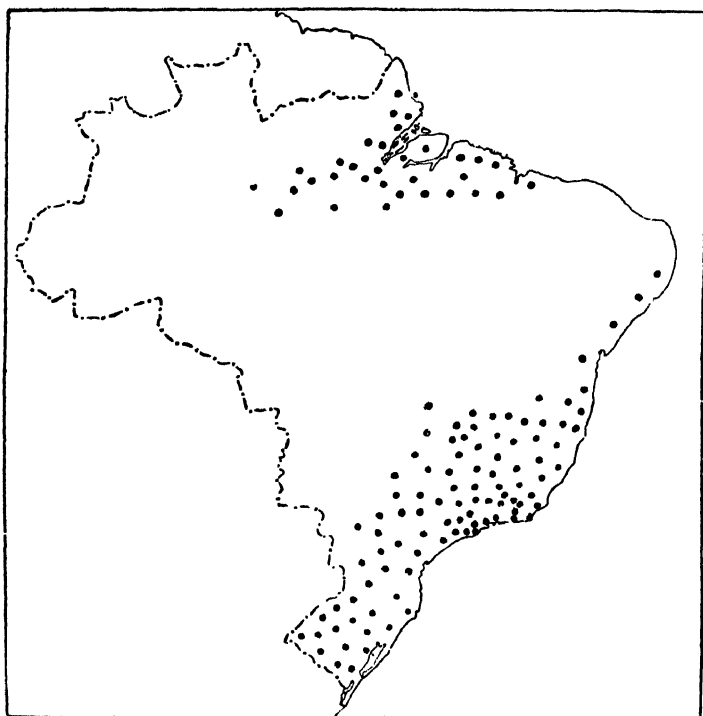


FIG. 291.—The distribution of maize in Brazil.

Each dot represents 1,000,000 bushels (1924-25). More maize is now grown north of Rio.

these are prepared from the manioc or mandioca, the distribution of which is shown in Fig. 292.

Other foodstuffs include sugar—especially from the coastal tracts of the east; maté or Paraguay tea, the restricted distribution of which is shown in Fig. 290; haricot beans, tobacco (especially in Bahia), and Brazil nuts.

Rubber.—Though a natural product of the Amazon forests, the declining importance of wild rubber from Brazil has already been dealt with in Part I. The best rubber in the world's markets (fine hard Para) still comes from Brazil. Plantation rubber is becoming important near Para.

Cattle and sheep—It is in the natural pasture lands of the south, particularly in the state of Rio Grande do Sul, that cattle—and also sheep—flourish. This state alone has more than a quarter the cattle and two-thirds of the sheep of Brazil. Conditions are not, however, as favourable as in the pastures of Argentina, largely owing to the fact that lucerne does not flourish. Dried and salted beef works and meat extract factories, therefore, still take a large proportion of the inferior cattle, only the best are

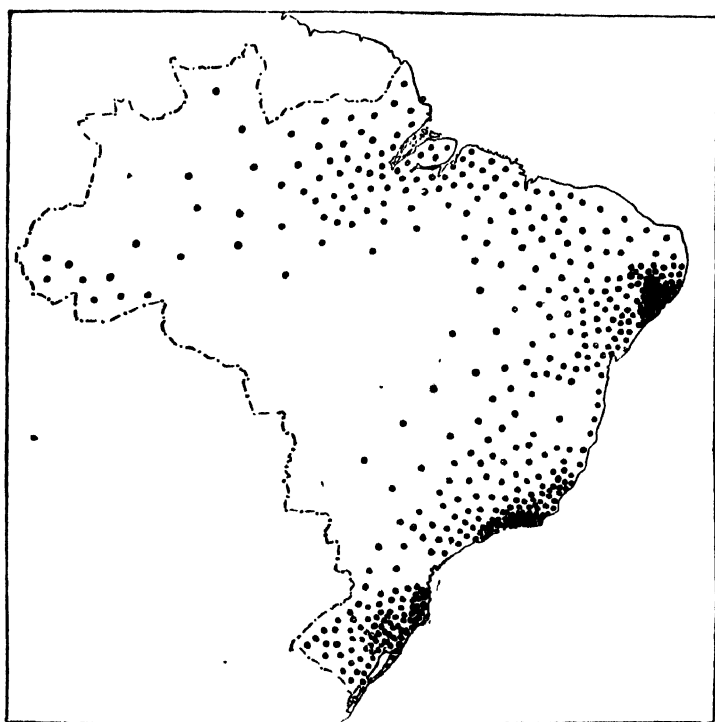


FIG. 292.—The distribution of manioc or mandioca—the principal starchy food—in Brazil.

Each dot represents several thousand tons (after Whitbeck and Hunnicutt).

suitable for the chilled beef trade. It is interesting to note that, until the war, Brazil was a meat-importing country. Temperature is the main factor limiting the sheep more rigidly to the south than the cattle, and land suitable for ranching exists over large areas of the plateau.

Pigs.—Pigs assume a greater importance in Brazil than in most countries, except the United States and China. Out of the 22,000,000 in the country, a fifth are in Rio Grande do Sul. As in the United States, maize is used in fattening, and there is a general tendency to specialize in the production of lard. The

products, however, both meat and lard, are consumed in the country.

Manufactures.—Cotton-weaving is the leading industry, and in 1935 employed 116,000 workers. There are also silk, woollen, and jute mills. The other manufacturing industries are concerned mainly with the preparation of foodstuffs. There are flour mills in Rio, using large quantities of Argentinian and Uruguayan wheat; meat-packing is important in the southern states; sugar factories in the north; whilst there are numerous tobacco works.

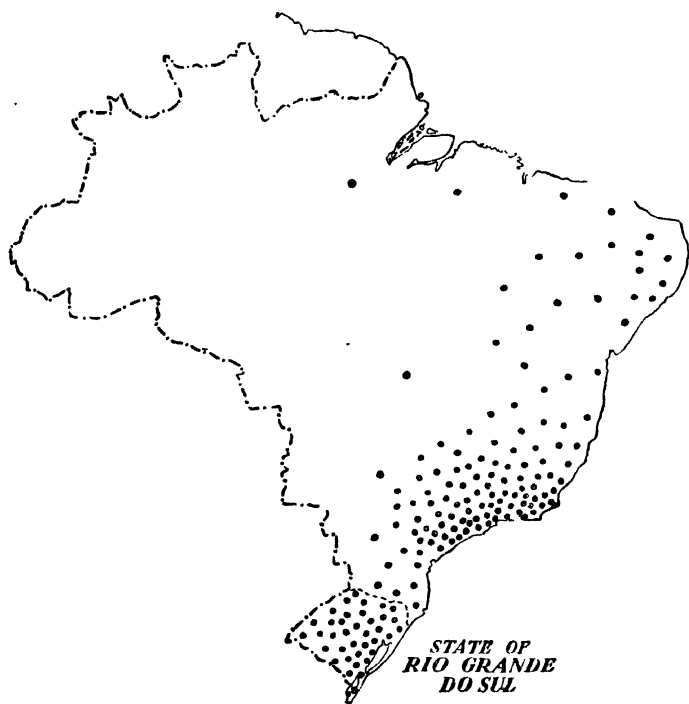


FIG. 293.—The distribution of pigs in Brazil.

Each dot represents 100,000 (16,200,000 in 1920 census). More pigs are now reared north of Rio.

Population.—A million and a half, or 5 per cent. of the total population are "foreigners"; over 500,000 Italians, nearly 500,000 Portuguese, and large numbers of Spaniards, immigrants from Asiatic Turkey, Germans, Austrians, Uruguayans, and 30,000 Japanese (1920). Much of the prosperity of the coffee industry depends upon Italian labour. Many of the foreigners are grouped in prosperous colonies, especially in the southern states.

Communications.—Although Brazil, in 1931, had 20,000 miles of railway, the vastness of the country is reflected in the absence of through railway communication. The railway network serves

the coffee regions, the southern states and the cotton lands, but in the north the Amazon is the great highway.

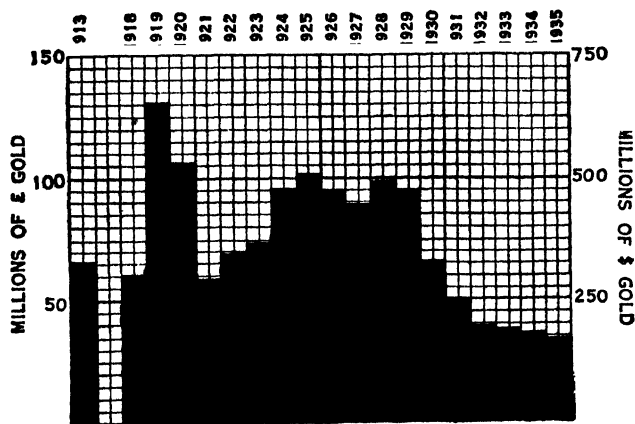


FIG. 294.—The exports of Brazil.

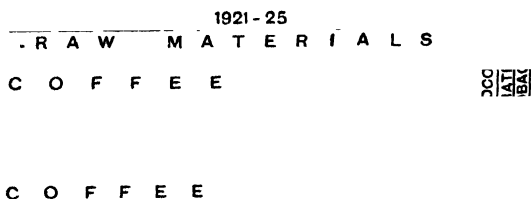


FIG. 295.—The exports of Brazil.

Foreign Trade.—Fig. 294 shows the fluctuations in value in recent years of the exports of Brazil. The principal items shown in Fig. 295 demonstrate the amazing predominance of coffee.

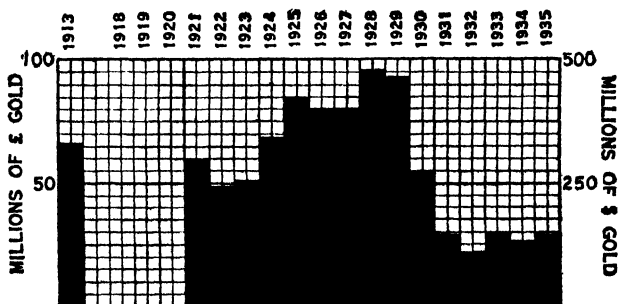


FIG. 296.—The imports of Brazil.

During the 1920 trade boom imports were valued at £125,000,000.

Fig. 296 shows the fluctuations in value of the imports, Fig. 297 shows the main items.

The direction of foreign trade is shown in Fig. 298.

The United States absorbs a very large proportion of Brazilian coffee, and this explains the heavy trade between the two countries. The United Kingdom, on the other hand, is a comparatively small

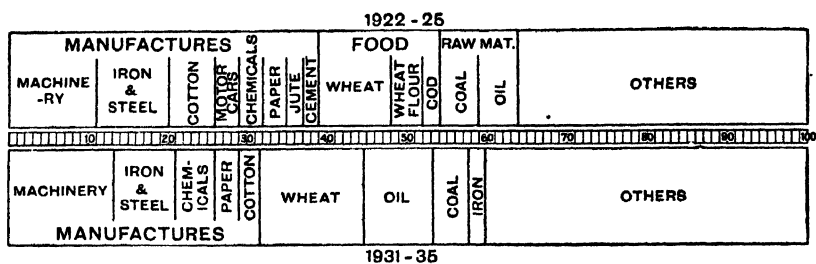


FIG. 297.—The imports of Brazil.

customer. The United States and the United Kingdom are both important suppliers of manufactured goods. These trade relationships form an interesting contrast with Argentina, which should be carefully noted.

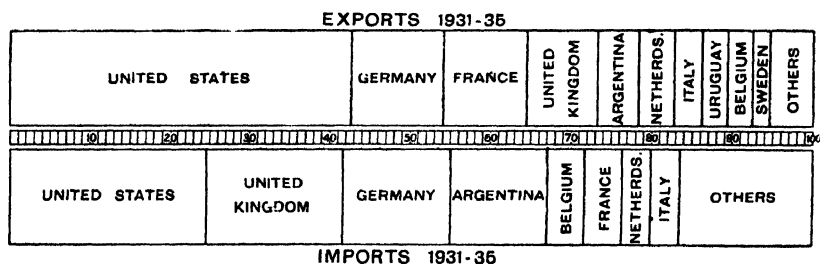


FIG. 298.—The direction of the foreign trade of Brazil.

THE NATURAL REGIONS OF BRAZIL

The Guiana Highlands.—The southern slope of the Guiana ancient massif lies in Brazilian territory. The Negro-Branco river system penetrates well into the plateau. There is actually a navigable channel—a natural overflow passage—connecting the Orinoco and the Upper Negro. Tracts of savana separated by strips of forest may, in the future, become cattle pastures, but the region is practically untouched at present.

The Amazon Lowlands.—Except for the elevated belt in the west, where the equatorial forest climbs without a break on to the slopes of the Andes (the Montana), the great, practically unbroken, stretch of forest which makes up this natural region lies mainly below the 500 contour line. Some 10 per cent. consists of low-lying alluvial plains subject to periodic flooding (*varzea*); the tracts lying above the reach of floods being known as “terra

firme," and it is on bluffs of the latter that such towns and settlements as do exist have been built. The natural region may be considered as bounded on the north and south by the outcrops of older rocks of the Guiana highlands and the Brazilian massif. Communication is almost entirely by river, as already mentioned above (p. 377). The life and commerce of the region are concentrated at the few ports along these main lines of communication—especially at Para and Manaos. Para is the natural outlet of the whole basin; Manaos has a well-selected central position. The Peruvian port of Iquitos is the collecting centre for the extreme west of the basin. Manaos is the rubber-collecting centre, but the steadily decreasing importance of wild rubber in the world's supplies may be counterbalanced in the near future when the plantations near Para come into bearing. The collecting of Brazil nuts is an industry of some little importance, but as yet the timber resources of the area are almost untouched. The Amazon basin is very thinly inhabited.

The Brazilian Plateau.—The Brazilian Plateau north of the Warm Temperate Forest Belt—that is north of about 20° S.—enjoys a tropical climate, and can, therefore, be regarded as distinct from the portion of the plateau lying further south. Over the vast mass of the interior the vegetation is of the savana type; to the north-east of Brazil this gives place to a dry type of vegetation with thorny succulent plants and known as the "caatingas" of Brazil, whilst along the coast there is a strip of forest. Being one of the old land masses of the world, the plateau has been deeply cut into by the river systems, and the most marked mountainous tract is the eastern edge of the plateau. The slow development of the interior, contained mainly within the confines of the States of Goyaz and Matto Grosso, is due in the main to its remoteness. The Paraguay and two railways just break into the southern fringe of this huge tract, but elsewhere communication is difficult. Gold and diamonds are worked in the southern part of Matto Grosso, but the main industry is the rearing of cattle—not, however, of very good quality.

The most important mineraliferous zone lies in the State of Minas Geraes and neighbouring parts of the east central part of the plateau. Here lie the richest reserves of high-grade iron ore known, probably, in the world; there are vast reserves of manganese, whilst gold and diamond mining are both carried on. The monazite of Brazil comes from the shores of Bahia State. Cattle-rearing is also important, and agriculture has assumed an increasing importance in recent years. The southern part of Minas Geraes (which is an extension of the rich ground of São Paulo) grows maize, rice, beans, mandioca, coffee, tobacco, sugar, and cotton, as well as vegetables for the coast towns.

Most of the north-east of the Brazilian plateau suffers from a deficient rainfall. Only along the coastal strip from Cape St. Roque southwards, and in a few of the more exposed heights does it exceed 40 inches. Cattle and goat rearing are staple industries, cotton is an important crop. Sugar, cocoa, coffee, and rice are crops belonging to the coastal strip; wax derived from the Canaúba palm is

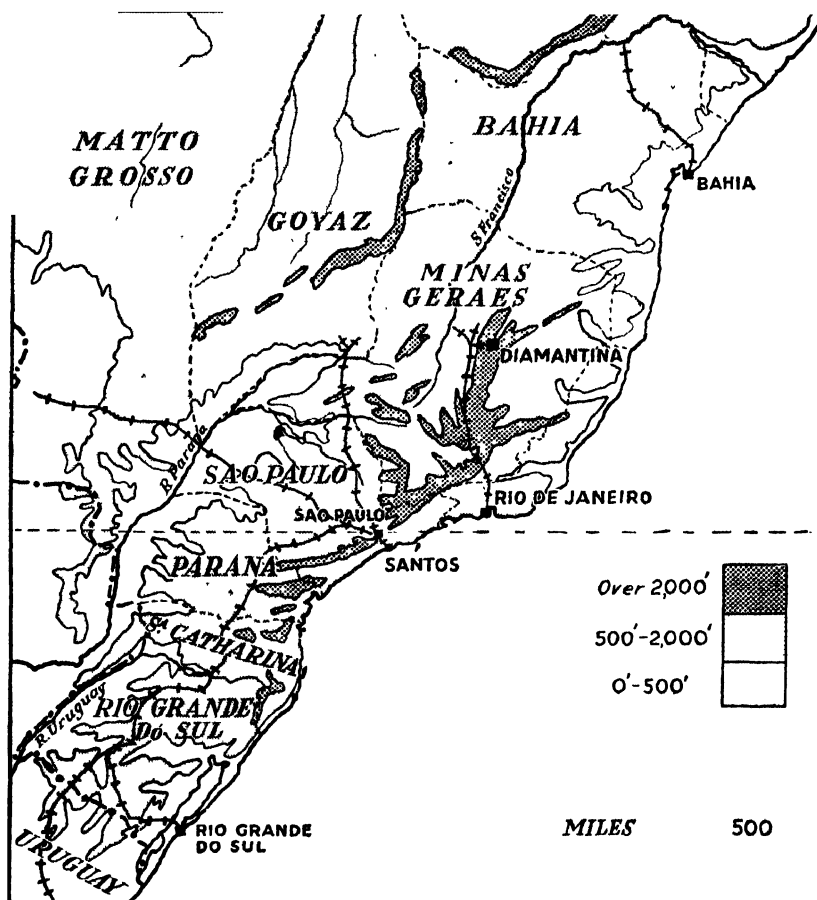


FIG. 299.—Southern Brazil.

Notice the coastal range which protects the coffee lands from the Trade Winds.

Note : a main railway connects São Paulo with Rio.

a product of the drier parts. The trade of the north-eastern part of the plateau is mainly through the ports of Bahia, Pernambuco, with S. Luis in the northern part. The mining districts are served especially by the capital, Rio de Janeiro.

The Southern Forest Region.—Stretching across the southern extension of the Brazilian plateau, roughly between latitudes

20° and 28°, is a belt of forest. It is separated from the quebracho forests of the Chaco by the Paraguay River, and is different in character, though both are linked together in Fig. 272. This forest is the natural home of the maté-producing tree (*Ilex paraguayensis*). In the eastern part, pines (*Araucaria*) are important in the forest as a source of soft timber. In the north-eastern part of this forest region, mainly in the State of São Paulo, lies the great coffee region of Brazil. Other crops flourish on the rich iron-bearing soils—sugar, rice, beans, and cotton may be mentioned—and stock-raising is important. Maize is a great crop along the coastal strip. The coffee region is well served by a network of railways centring on the town of São Paulo, and the port of Santos. Manufactures are concentrated in the towns of São Paulo and Rio.

The Grasslands of Southern Brazil.—The grasslands correspond roughly with the State of Rio Grande do Sul and extend southwards to include Uruguay. The rainfall is heavier than on the grasslands of Argentina. The vast natural pastures support great numbers of cattle and sheep; as already mentioned, Rio Grande has two-thirds of the sheep and a quarter of the cattle of the whole of Brazil. Maize is the great cereal, but rice is extensively cultivated along the coastal strip where broad lowlands with lagoons are found. Much fruit, including grapes, is grown in the southern part of Brazil. The trade is concentrated in Rio Grande.

CHILE

Position and Size.—The Republic of Chile has an area of roughly 290,000 square miles, and a total population of 4,287,000 (census of 1930). Nearly 50 per cent. of the population is urban. The majority of the inhabitants are of European origin; the indigenous population comprises the Fuegians of the south, the Araucans who live in the valleys on the western slopes of the Andes, and the Changos of the northern coast. Chile declared herself independent of Spain in 1810. 2,500 miles from north to south, Chile is nowhere more than 200 miles from east to west and is generally much narrower.

Physical Features and Geology.—Broadly speaking, Chile occupies the narrow strip between the crest of the Andes and the Pacific Ocean. More especially in the south there is a clearly marked threefold division into the Andes, the Longitudinal Valley and the Coastal Range. The Longitudinal Valley varies in width from nothing up to 30 or 40 miles, but is broken up by small cross ridges. In the south it sinks to below sea level and its place is therefore taken by arms of the Pacific Ocean.

In the north, permanent rivers are few; they lose themselves

in the desert before reaching the coast; in the south they are checked by the Coastal Ranges and have piled up a thick mass of sediment so that the level of the Longitudinal Valley is steadily being raised.

The wealth of Chile consists chiefly in its minerals, which fall broadly into three groups:

(a) The nitrate deposits of the desert regions of the north, producing annually in normal years between 2 and $2\frac{1}{2}$ million tons (1932, 1.1 mn.).

(b) The metallic minerals, found mainly in the northern provinces, including gold, silver, copper (Chile is the world's second largest producer of copper), iron, manganese, and cobalt.

(c) The coal fields found to the south of Valparaíso (production about $1\frac{1}{2}$ million tons).

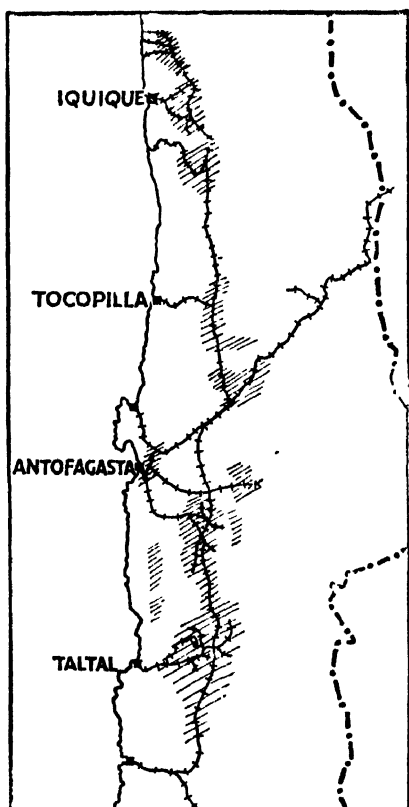


FIG. 300.—The nitrate fields of Chile.

The nitrate fields are shaded, the chief railways and nitrate ports are shown.

The Climate and Natural Vegetation of Chile.—Reference to Fig. 272 will show that, apart from a strip of the high Andine region with an "Alpine" climate, Chile falls into three climatic vegetation regions. There is the Hot Desert in the north, passing around Valparaíso into the small but important Mediterranean region, and then into the Cold Temperate Oceanic region in the south. Chile includes also small areas of the

temperate sheep-rearing country of Patagonia and Tierra del Fuego, described under Argentina.

The extensive natural forests of the south are not at present much exploited. The Chilean pine is one of the most valued trees, and grows mainly on the mountain zone up to 5,000 feet. Elsewhere the Southern Beech is often the principal tree.

Agriculture.—The total area of agricultural land is about 63,000,000 acres, together with 35,000,000 acres of meadows.

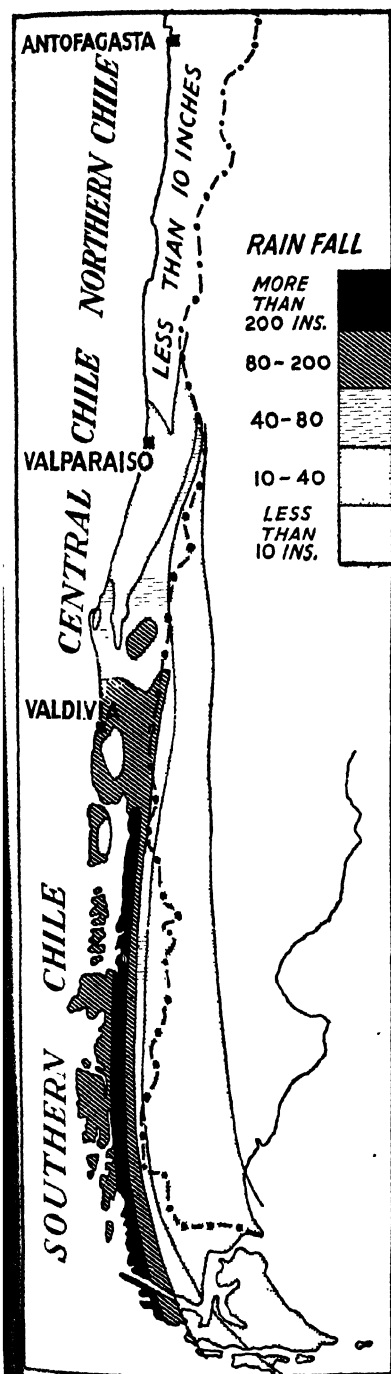


FIG. 301.—The rainfall of Chile.

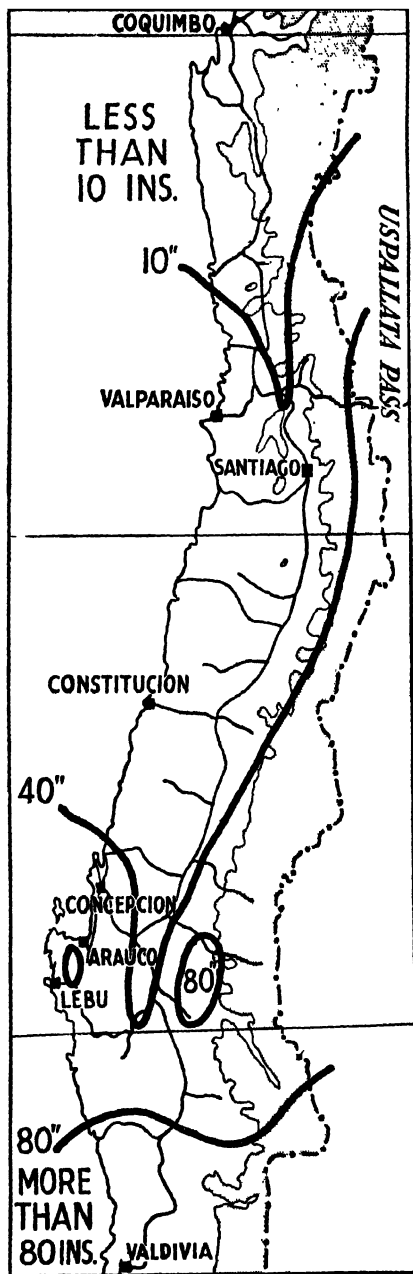


FIG. 302.—Central Chile (the Mediterranean or agricultural belt).

Land over 3,000 feet, stippled. The latitudes shown are those of 30°, 34°, and 38°.

Most of this is found in the Mediterranean belt, which is, indeed, often referred to as the "agricultural zone" in contrast to the arid zone in the north and the forest zone in the south. In the agricultural belt Chile produces large quantities of cereals, fruit, and vegetables, as well as excellent wine. There is naturally interstate trade in that the agricultural belt supports the mining com-

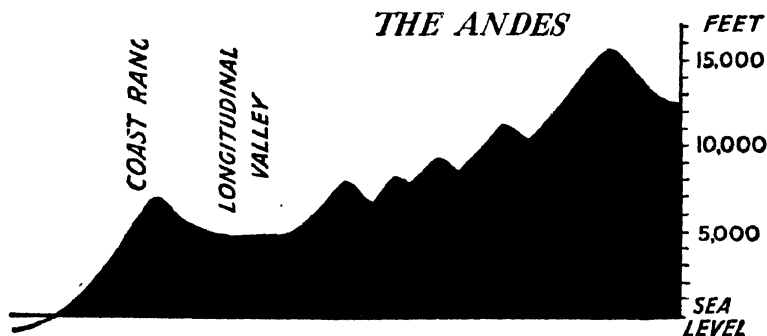


FIG. 303.—Section across Central Chile.

munity of the arid north. Chile has 2,000,000 cattle, 4,000,000 sheep, and large numbers of goats and pigs, and dairy farming is increasing.

Communications.—Until recently the only means of communication between the north and south of Chile was by means of the sea. Now a state-owned line has been completed throughout

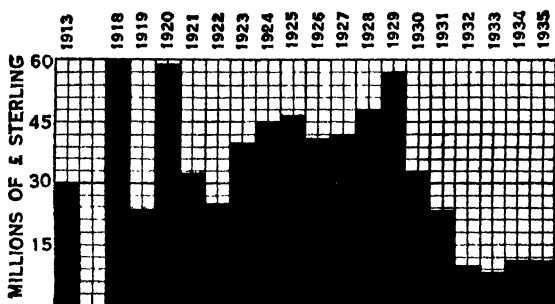


FIG. 304.—The exports of Chile (excluding ships' stores).
Notice the tragic drop—due to world-wide agricultural depression.

practically the whole length of Chile, though the sea remains the most important highway between the agricultural and mining belts. Along the northern coast there is a string of nitrate ports, all of which suffer from the lack of natural harbours, and are only open roadsteads. The more important, Arica, and Antofagasta are railway terminals serving as outlets, not only for the nitrate fields and mining districts of Chile, but also for the Bolivian

plateau beyond. The ports of the central and southern regions also have indifferent harbours, though Valparaiso and San Antonia have been modernized. The railway system suffers from a multi-

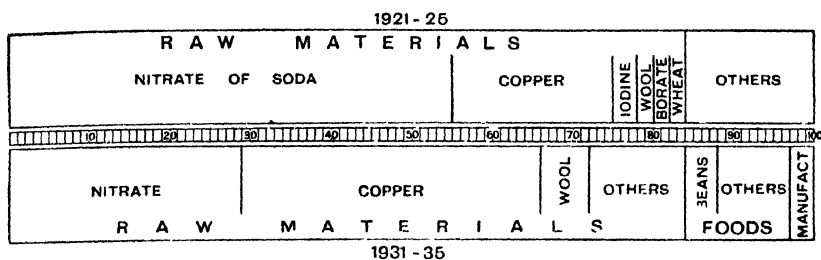


FIG. 305.—The exports of Chile (note: Borate = Borate of Lime).

plicity of gauges—five different ones are in use—the legacy of the days when the system consisted of numerous privately owned lines running inland from the various ports.

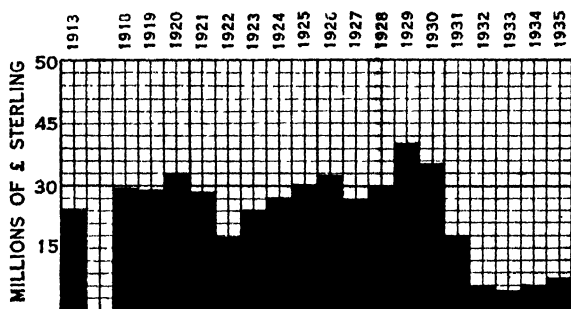


FIG. 306.—The imports of Chile.

Foreign Trade.—Nitrate and copper are the mainstays of Chilean prosperity, as shown in Fig. 305. The once-feared

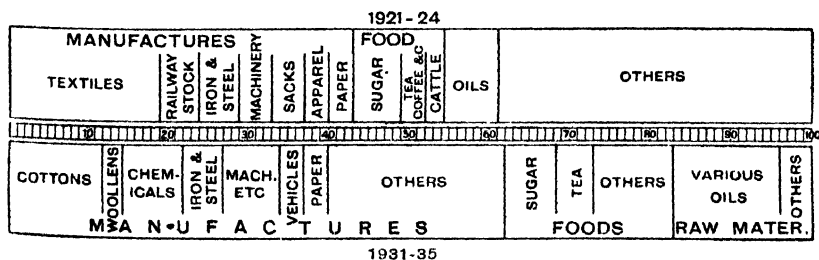


FIG. 307.—The imports of Chile.

exhaustion of the nitrate deposits has been alleviated by the discovery of vast new fields, but the demand abroad for nitrate is menaced by the supplies of artificial fertiliser. However, the

increased use of fertiliser may later allow the absorption of supplies from both sources. The principal exports show that Chile is self-supporting in the matter of foodstuffs except tea and sugar. The chief customers for Chile's nitrate are the United States, Great Britain, and the industrial countries of Europe where intensive cultivation must be practised.

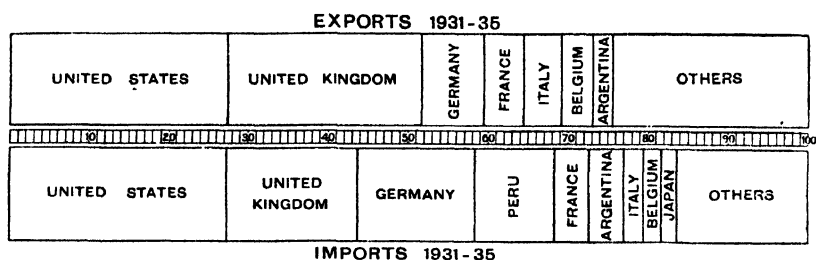


FIG. 308.—The direction of the foreign trade of Chile.

Actually the direction of the foreign trade has varied very widely from year to year.

THE NATURAL REGIONS OF CHILE

The Arid North.—In the northern arid tract the Longitudinal Valley is not conspicuous on a map because its floor has been raised by deposits of sediment several thousand feet above sea-level. The Atacama Desert, which occupies much of the valley in the north of Chile, is crossed by a number of streams deriving their water from the heights of the Andes. Except where the water is highly charged with mineral matter, these streams have been utilized to create ribbon-like oases which support half a million people. The nitrate-bearing deposits, or "caliche," occur as thick beds on or near the surface of the rainless deserts. The proportion of nitrate of soda in the caliche varies; an important by-product is iodine. Nitrate of soda is a very soluble salt and would be removed rapidly in an area with even a slight rainfall. The nitrate fields and their ports are thus practically rainless, and their 250,000 inhabitants depend almost entirely on outside sources for food and even for much of their water. The copper and other metalliferous mines are mainly in the high Andes, where the conditions are not quite so arid.

The Mediterranean or Agricultural Belt.—Here the three-fold physical division is well marked. Generally speaking the rainfall is heavier on the coast and coastal range, than in the great valley (compare Valparaiso 20 inches, Santiago 14 inches). Valparaiso has a typical winter rainfall, but southwards the length of the rainy season gradually increases together with the total amount. Scattered forests of beech, laurel, and cypress appear

in the Mediterranean belt, but the original vegetation has been largely cleared. The close similarity between the Mediterranean belt of Chile and California should be noted. The principal coal fields lie to the south of the Mediterranean region between Arauco and Concepcion and around Lebu.

The Forest Belt.—On the whole, southern Chile is little developed. The valuable timber—the Chilean pine—has been removed from the more accessible regions, and although efforts are being made to promote scientific forestry, the pine is a slow-growing tree. Chile figures at present as a timber-importing country. The rainfall along the coastal range is very heavy—exceeding 200 inches. Even at the important town of Valdivia, on the coast, it is 107 inches, with a marked winter maximum.

BOLIVIA

Bolivia is a large but backward state, consisting of two regions :

(a) The western region, a great plateau of an elevation of 12,000 feet with an inland drainage into Lake Titicaca. This plateau is rich in minerals, especially tin and silver, but only those born in the country can work for extended periods at such a great height above sea-level. The minerals have to be exported through the ports of Mollendo in Peru, or Arica and Antofagasta in Chile.

(b) The eastern region, sloping down to the valleys of the Amazon Basin, has the climate and natural resources of the Amazon Basin, except that they are slightly modified by the greater elevation. The region is known as the Montana. Its natural outlet is through Brazil by river, or through the Argentine by railway.

La Paz, on the plateau, is the principal town of Bolivia.

PERU

Like Bolivia, Peru consists of part of the Andine tableland and the Montana. Peru, however, has the advantage of possessing a strip of the Pacific coastal plain.

Although it is a desert, the coastal strip is the most important region of Peru. Irrigation can be practised there, and the production of sugar and cotton is increasing. *Lima*, the capital, is in this belt, and *Callao* is the great port. *Mollendo*, to the south, is the port for Bolivia. As in Bolivia, the Andine Region is rich in minerals (copper and silver), and in this region the llama is valued as a transport animal and for its wool, whilst the alpaca yields valuable wool. The Montana Region is still undeveloped.

ECUADOR

Ecuador falls within the same three natural regions as Peru, but here the coastal strip receives a good rainfall and the production of cocoa is important. Quito, the capital, is almost on the equator, but is at a height of 9,000 feet above sea-level, and has an average temperature of only 55.5° , with an extraordinarily small annual range, less than 1° .

COLOMBIA

Colombia is at the northern end of the main chain of the Andes, and there the mountains have split into four branches. The natural regions into which the country can be divided are as follows :

(a) The lowlands of the coast and the main valleys between the Andine chains. The most important valleys are those of the Magdalena and Cauca. The climate is equatorial, with the usual products such as cocoa, sugar, cotton, and bananas. *Bogota*, the capital and main centre of population, is on the plateau near the Magdalena Valley.

(b) The mountain spurs. The slopes, between 3,000 and 7,000 feet, produce coffee and maize, and the former is exported to the United States ; higher up wheat and other grains are grown for home use, but lands above 10,000 feet are uninhabited.

The minerals of the mountain regions are probably valuable, and important oil fields have recently been discovered near the coast. The Magdalena and Cauca are the great highways, and most of the export trade is through the ports of Cartagena and Puerto Columbia (Barranquilla).

VENEZUELA

Venezuela falls into four natural regions :

(a) The northern coastal lowlands, where the oil fields of the Maracaibo Basin have recently become important. Cocoa and sugar are produced.

(b) The mountain spur from the Andes, and its production of coffee and maize.

(c) The llanos or grassy plains of the Orinoco Basin, devoted largely to cattle.

(d) The little developed Guiana highlands.

Caracas, the capital, is connected with its port, *La Guaira*, by railway, but there are few other towns of importance.

GUIANA

Guiana consists of an undeveloped upland in the south, rich in minerals, and a tropical lowland in the north. It is divided into British, Dutch, and French Guiana, each colony centring around a small river basin. Gold and diamonds are the most important products of the highlands, whilst sugar, rice, and cocoa are produced in the lowlands. Georgetown, the capital of British Guiana, is near the mouth of the Essequibo.

TRINIDAD

Trinidad is a small island near the mouth of the Orinoco River. It is a British possession and has very valuable oil fields.

EXERCISES

1. Agriculture in Argentina. Complete the table from the *Statesman's Year Book*.
2. The foreign trade of Argentina. Figs. 284 to 287 may be completed from the *Annual Report on the Balance of Trade* (5'04 gold pesos are equal to £1). For Figs. 284 and 285 the figures are given in sterling in the *Statesman's Year Book*.
3. Agriculture in Brazil. Complete the table from the *Statesman's Year Book*.
4. The foreign trade of Brazil. Figs. 294 to 297 may be completed from the *Annual Report on the Balance of Trade* or from the *Statesman's Year Book*.
5. The foreign trade of Chile. Figs. 304 to 307 may be completed from the *Annual Report on the Balance of Trade* or the *Statesman's Year Book* (a gold peso = 1s. 6d.).

EXAMINATION QUESTIONS

1. Write a geographical description of Brazil, noting specially those features that have led and may lead to economic expansion. (*Univ. London Inter. B.Sc. (Econ.)*, 1927.)
2. What do you understand by the term "Mediterranean Climate?" Discuss the application of the term to climatic conditions in South America. (*Univ. London Inter. B.Sc. (Econ.)*, 1927.)
3. Give an account of the climates and products of Peru. (*Univ. London Inter. B. Com.*, 1926.)
4. Give an account of the mineral products of South America (*Univ. London Inter. B. Com.*, 1927.)
5. Give a brief account of the foreign trade of Argentina. (*Univ. London Inter. B. Com.*, 1928.)
6. Contrast the climates of Chile and Argentina and say how far the contrast can be traced to the influence of the Andine Chain. (*Univ. London General School Exam.*, 1928.)
7. Consider the main geographical impediments that lie in the way of the economic development of the Amazon Basin. (*London Inter-Coll. Schol.*, 1927.)
8. Write a description of either the Rocky Mountain system or the South American Cordillera. (*London Inter-Coll. Schol.*, 1927.)

CHAPTER XVII

AFRICA ¹

GENERAL CONSIDERATIONS

Position and Size.—With an area of 11,000,000 square miles, Africa is the second largest continent, being next to Asia in size.

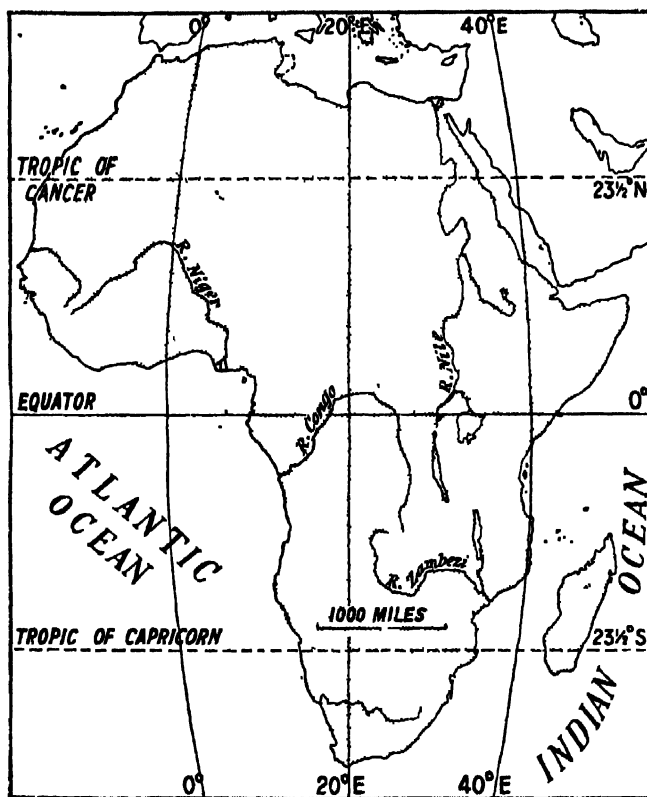


FIG. 309.—The position and size of Africa.

Although three times the size of Europe, the coastline of Africa is only 19,000 miles long—shorter than that of Europe. Much of the continent is far from the ocean, for there are few deep bays

¹ This chapter is based on the section on Africa in *The World : a General Geography for South African Schools*, by L. D. Stamp and J. N. Jamieson (Longmans). For a fuller treatment of the smaller countries, see Longmans Regional Geographies, Book II, Africa, by S. H. Beaver and L. D. Stamp.

or gulfs. Africa is the only continent which is almost cut in half by the equator. Rather more lies to the north of the equator than to the south, but the north and south coasts are almost exactly equal distances from the equator. The position of the two Tropics and the meridian of 20° E. should be noted.

Physical Features.—Except for the Atlas Mountains in the north-west, which really belong to the European Alpine system of folded mountains, the whole of Africa is occupied by a plateau

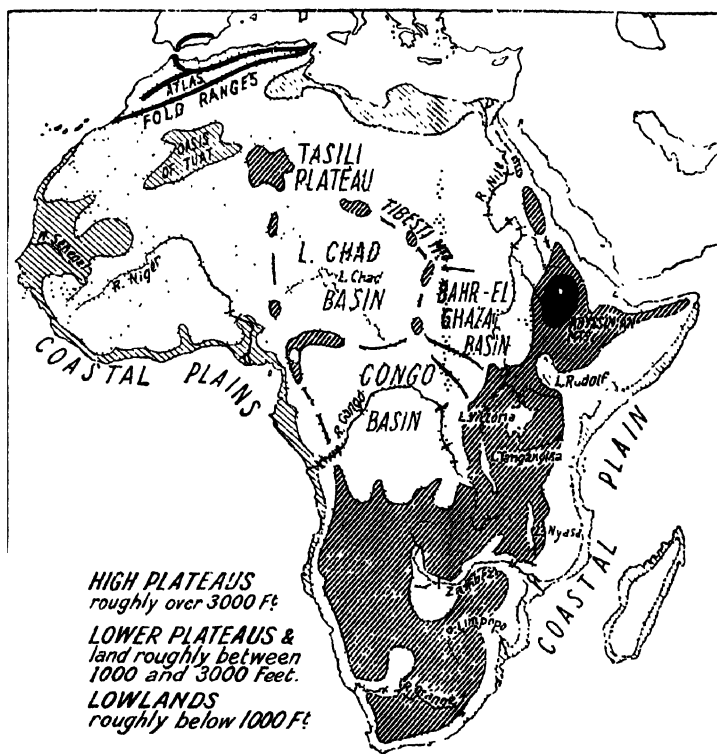


FIG. 310.—The main physical features of Africa.

with only a narrow coastal plain separating the plateau from the encircling oceans. Sometimes, however, as in South Africa, there are several "steps" on to the plateau. As shown in Fig. 310, the African plateau is higher in the south than in the north. The higher portion of the plateau stretches nearly as far north as the equator, and is then deeply cut into by the basins of the Congo, Nile, and L. Chad, so that the high plateau, as it were, sends branches northwards, separating the river basins. The broadest branch is the eastern one, on which are situated the well-known lakes of

East Africa. It is on the surface of this part of the plateau and in Abyssinia that old volcanoes have built up a series of lofty cones. In South Africa the high south-eastern edge of the plateau, well over 6,000 feet, forms the Drakensberg Range.

Rivers.—The nature of the African rivers is determined largely by the plateau character of the continent. Most of them have a long, navigable, upper course on the surface of the plateau, and then they descend rapidly to the coastal plain by a series of rapids and waterfalls. The bars across the rivers in Fig. 310 indicate the position of the principal rapids or falls. It follows that few of the rivers are navigable far inland from the coast, and this was one of the factors which hindered the exploration of the erstwhile "Dark Continent." The discovery of the navigable upper courses has facilitated later exploration and development. In some cases the falls and rapids are more widely separated, and the rivers descend from the plateau in a series of steps. This is particularly the case with the Nile. The most important rivers of Africa are the Nile, which flows northwards into the Mediterranean Sea; the Senegal, Niger, Congo, and Orange draining into the Atlantic Ocean; and the Limpopo and Zambesi flowing into the Indian Ocean.

Lakes.—The lakes on the East African plateau are arranged along two main lines, which are believed by some to represent two great rift valleys. Lakes Albert, Edward, and Tanganyika lie along the western line; Lakes Rudolf and Nyasa along the eastern line; Lake Victoria on the plateau. To the south of the Sahara lies Lake Chad, the centre of a region of inland drainage.

Climate.—Africa lies both to the north and to the south of the equator, and care is therefore necessary in referring to "summer" or "winter" conditions.

Conditions from November to April.—During this half of the year the southward swing of the wind systems results in summer conditions in South Africa. Owing, however, to its elevation the plateau remains comparatively cool, as shown in Fig. 311, and only the plains of the Guinea Coast and East African Coast have an average temperature of over 80° in January. At the same time, as shown in Fig. 312, the wind belts swing southwards, and the belt of greatest rainfall lies south of the equator. At this season also the northern coasts come under the influence of the westerly winds and receive the usual winter rainfall of Mediterranean lands.

Conditions from May to October.—The northward swing of the wind systems results in the belt of tropical rainfall lying north of the equator (Fig. 313) and the south-western coasts coming under the influence of the westerlies (giving a winter rainfall). At this season the Sahara becomes extremely hot (Fig. 314), but the South African plateau is cooler owing to its altitude.

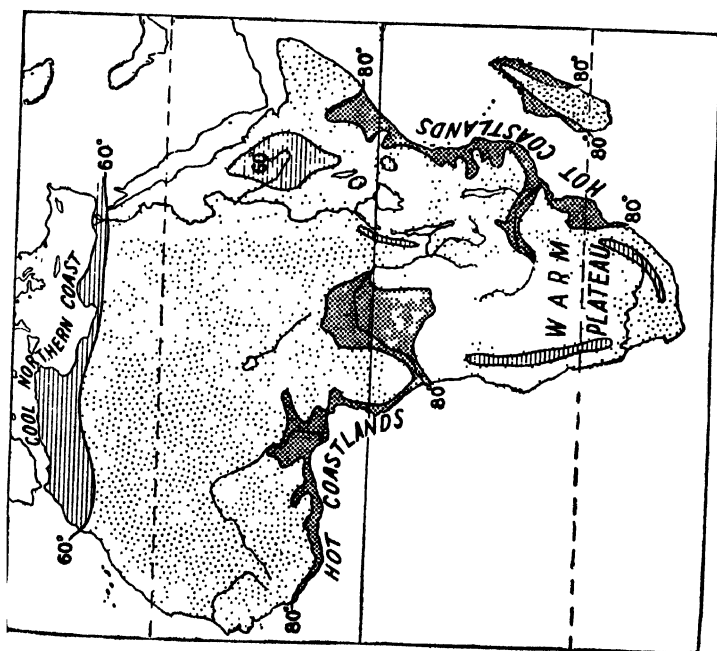


FIG. 311.—Climate: average surface temperatures in January.

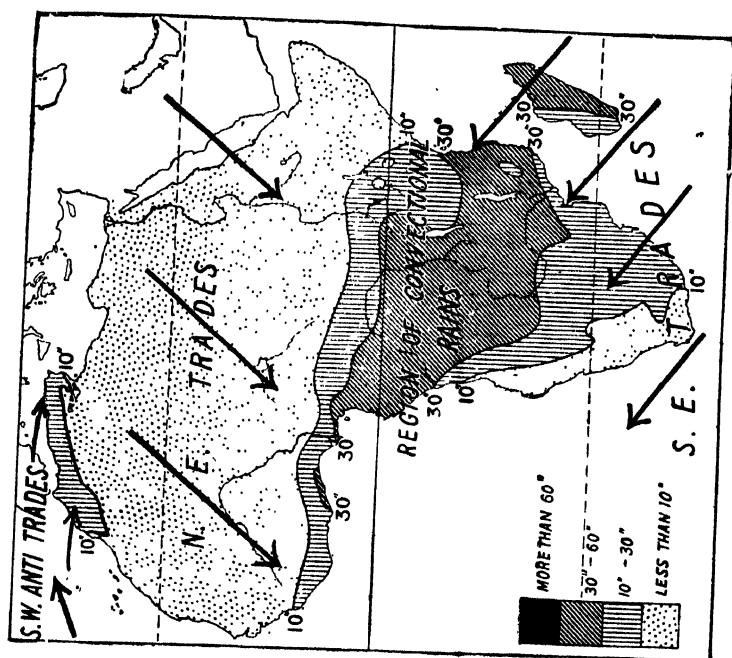


FIG. 312.—Climate: rainfall and winds, November to April.

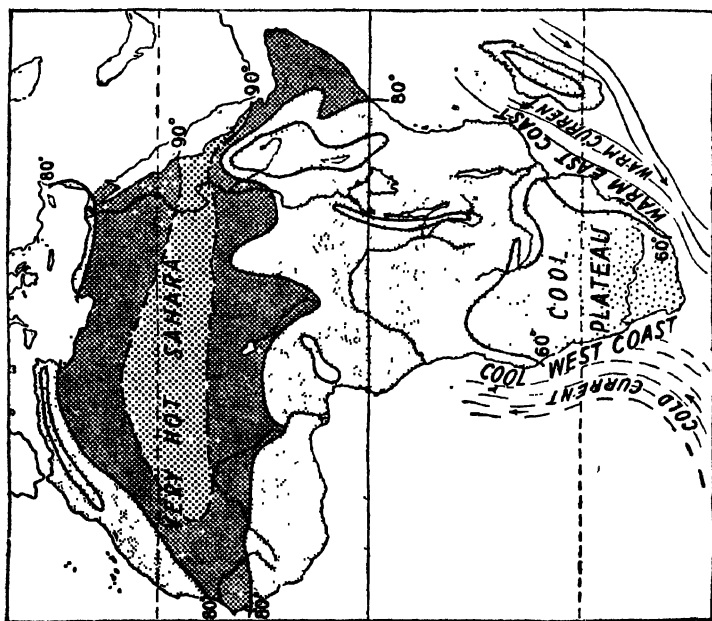


FIG. 313.—Climate: average surface temperatures in July.

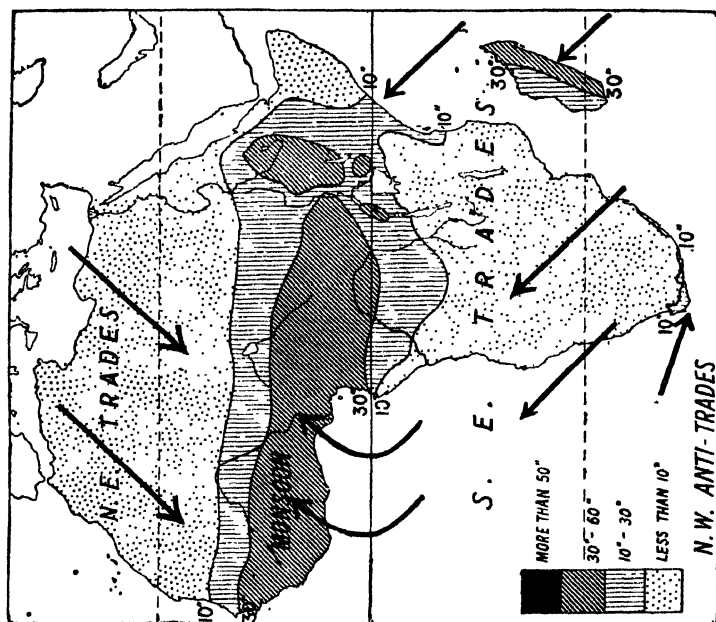


FIG. 314.—Climate: rainfall and winds, May to October.

Climatic Regions.—The climates of Africa are arranged so that the same types of climate are found to the north of the equator as to the south.

(a) *The Equatorial Climate* is found along the equator, especially in the Basin of the Congo, and along the low coastlands of the Gulf of Guinea.

(b) *The Tropical Climate*, with summer rain, is found both

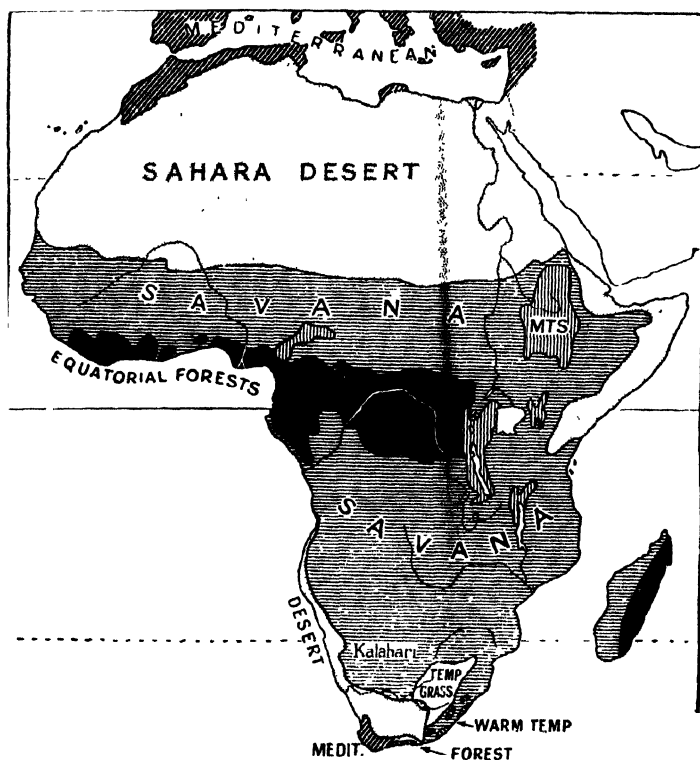


FIG. 315.—The natural vegetation of Africa.

to the north and south of the equator. So characteristic of Africa is this climate that it is from Africa that it derives the name of the "Sudan type."

(c) *The Hot Desert Climate* is found along the high-pressure belts both in the north and in the south. In the north it stretches right across the continent, but in the south it is found only on the west of the continent. There the east side receives moisture from the Trade Winds blowing across the Indian Ocean.

(d) *The Mediterranean Climate* is found both along the north-west and the south-west coasts.

(e) *The Warm Temperate Oceanic and Temperate Continental Climates* are found, owing to topography, only in the south.

Natural Vegetation.—As shown in Fig. 315, the vegetation regions of Africa correspond closely with the climatic regions.

Population.—In Africa it is very clearly shown that a great desert can act as a barrier to mankind. North of the Sahara the people are Moors, Arabs, and Egyptians—closely allied to the

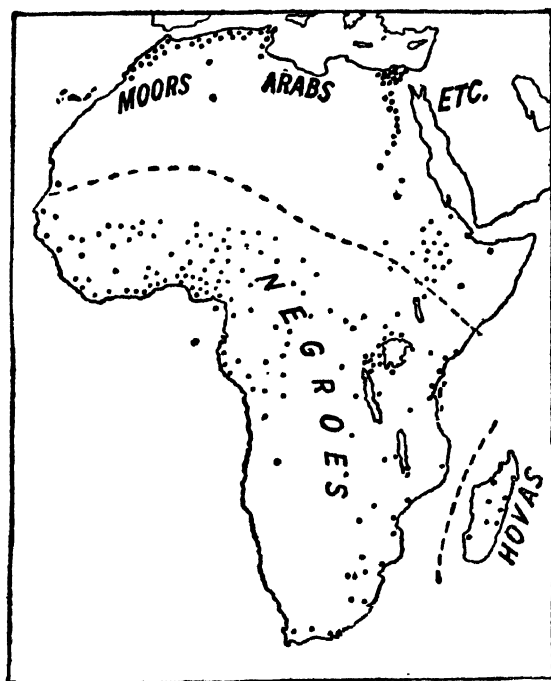


FIG. 316.—The population of Africa.

Each dot represents 500,000 people.

peoples of Southern Europe. But Africa, south of the Sahara, is inhabited almost entirely by the woolly haired, black-skinned negroid peoples—including the true negroes and the Bantu. In the less accessible and less hospitable parts of the continent, there are small groups of very backward, uncivilized peoples. They have been forced into the worst parts of the continent, and include such groups as the Pygmies of the Congo forests and the Bushmen of the borders of the Kalahari Desert. Africa as a whole is not very thickly populated and there is plenty of room for white settlement and development.

SOUTH AFRICA

"South Africa" occupies the bulk of the southern part of the continent. Nearly the whole, excepting parts of Bechuanaland and South-West Africa, lies outside the Tropics. This vast area comprises three main political divisions :

1. The Union of South Africa (Unie van Zuid Afrika), defined according to the recent Status Act as "a sovereign independent state," is a Dominion within the British Commonwealth of Nations, and was formed in 1910 by the union of the four provinces of the Cape of Good Hope, Natal, the Orange Free State, and the Transvaal.

2. Included under the Administration of the Union is the mandated territory of South-West Africa (formerly German South-West Africa).

3. The three separate areas of Basutoland, Bechuanaland, and Swaziland are at present protectorates under Imperial control. They are enclaves within Union territory, though the northern frontier of Bechuanaland marches with Angola and the Rhodesias.

On the east the Transvaal is cut off from the Indian Ocean by the territory of Portuguese East Africa ; on the west there is a large stretch of very dry country, the Kalahari semi-desert. In the main, therefore, the outlet of the whole of British South Africa is towards the south.

The following table is given for reference purposes :

	Area in sq. miles	Population (1936)	
		Europeans	Natives, etc.
Union of South Africa (four provinces only)	473,089	2,003,512	7,585,153
Cape	276,966	791,394	2,737,633
O.F.S.	50,389	200,947	570,907
Transvaal	119,459	820,620	2,520,524
Natal	35,284	190,551	1,756,091
S.W. Africa	322,393	31,600*	328,467*
Basutoland	11,716	1,458	559,534 ¹
Bechuanaland Protectorate	275,000	1,899	263,857
Swaziland	6,704	2,935	152,502

* Estimated, 1934.

¹ Excluding about 70,000 absent on employment in mines, etc., in the Union.

Physical Features.—The great African plateau is highest in the south, that is, in South Africa. Here the greatest heights are reached along the south-eastern edge, and the surface of the plateau slopes, on the whole, towards the north and west. It will be obvious that South Africa is at once divisible into two parts :

1. The interior plateau.
2. The country between the escarpment or edge of the plateau and the sea.

The Interior Plateau is a region of great plains. The surface

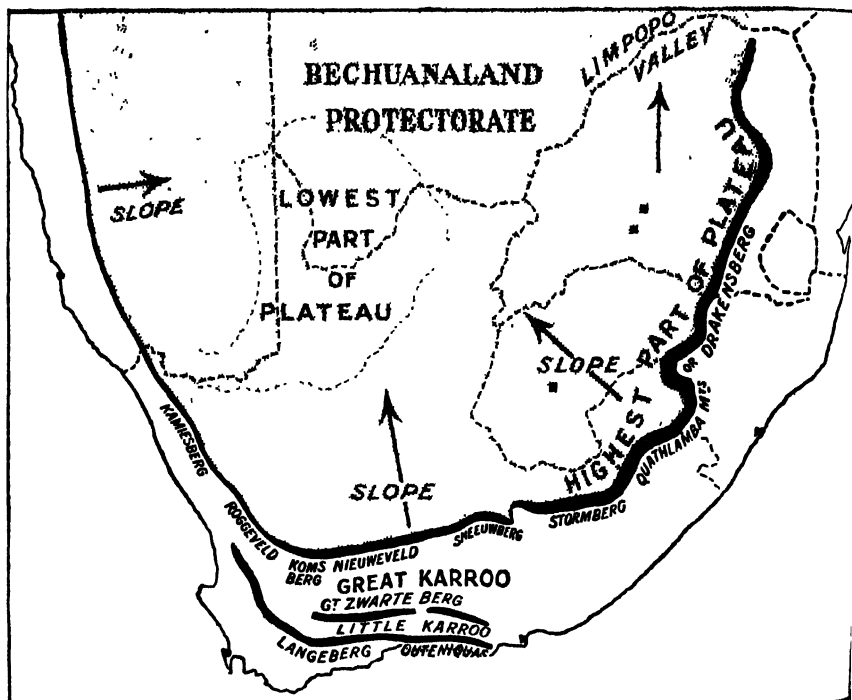


FIG. 317.—The physical features of South Africa.

Note carefully the position of the great escarpment and the high plateau of which it is the boundary.

is sometimes almost flat, at other times gently rolling, whilst sometimes low, flat-topped hills rise from its surface. The surface is, on the whole, saucer-shaped with the western rim of the saucer lower than the southern and eastern. Except in the centre, nearly the whole is more than 4,000 feet above sea-level. The escarpment receives various names : in the Transvaal it is known as the Drakensberg ; farther south, where it forms the boundary between the Orange Free State and Basutoland on the one side and Natal on the other, it is known either as the Drakensberg or the Quathlamba Mountains. Then the edge turns westwards and runs

through the Cape Province as the Stormberg, Sneeuwberg, Nieuweveld, Komsberg, Roggeveld, and Kamiesberg. The lower western edge through South-West Africa has various names. Fig. 317 shows that the whole of the Transvaal lies on the plateau, and so do the whole of the Free State and Basutoland. About one-third of the Cape Province is on the plateau; Bechuanaland, with the Kalahari Desert, occupies the lower part of the saucer. The highest points of the south-eastern edge reach 11,000 feet (Giant's Castle).

The plateau is drained, as one would expect, by rivers which rise near its high south-eastern or eastern edge and have a long course to the west to the Atlantic Ocean. Except for the northern

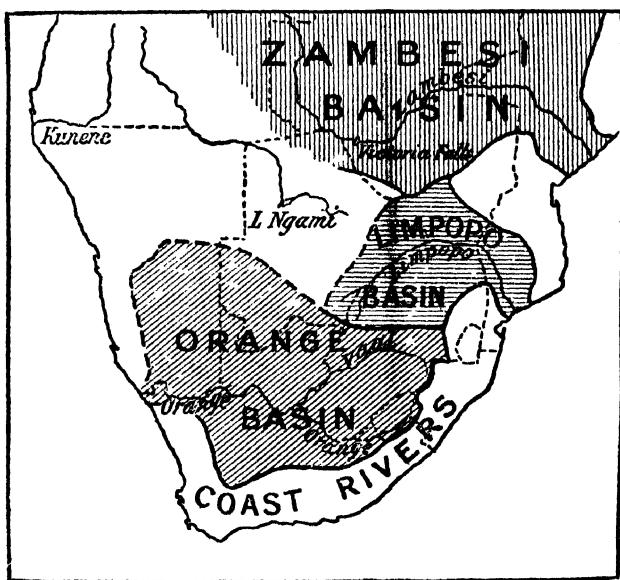


FIG. 318.--The rivers and river basins of South Africa.

part of the Transvaal all the interior plateau of the Union (including most of South-West Africa) lies in the basin of the Orange river, with its two chief tributaries, the Caledon and the Vaal. The rainier part of the plateau being the east, the rivers there usually have some water in them, but in the west the Orange river flows through very dry country and receives no important tributaries. This part, in the dry season, may be only a succession of pools. About 300 miles from the ocean the Orange River commences its descent from the plateau in the Aughrabies Falls. The northern part of the Transvaal is drained by the tributaries of the Limpopo river, the Limpopo itself forming the boundary between the Transvaal and Southern Rhodesia for a considerable distance.

and then breaking through the eastern escarpment and emptying itself into the Indian Ocean. Neither the Limpopo nor the Orange river is of any importance as a highway, and though the Orange river runs through very dry country for much of its course, its value for irrigation purposes is minimized by the fact that the river flows between steep high banks considerably below the general land level. Many of the South African rivers are liable to sudden floods, and a great trouble to farmers in the Union is the formation of deep "dongas" or gullies; the rain when it falls drains rapidly away along these dongas instead of moistening and enriching the surface soil. There are no large lakes in South Africa, but scattered over the surface of the plateau are large numbers of shallow hollows known as pans or vleis. It is believed that the loose sand or soil which once covered these areas has been blown away by the action of wind, leaving hollows which may be covered by water after heavy rain. Many of the pans when dry are covered with deposits of salt.

The Country between the Plateau and the Sea.—This tract is

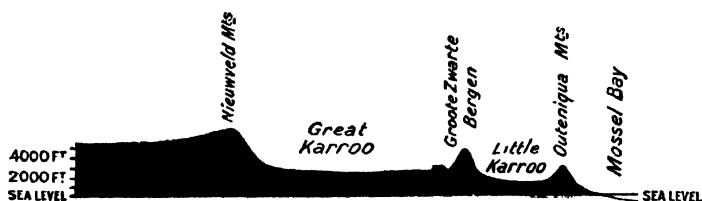


FIG. 319.—Section from the High Veld to the South Coast.

not a coastal plain. In the south-west there are numerous fold mountains separated by fertile valleys; in the south there are, as shown in Fig. 319, a number of "steps" up to the surface of the plateau from the coast. The lowest "step" is the narrow coastal plain or coastal plateau—it is often several hundred feet above sea-level. Then comes a range of mountains—the Langeberg and Outeniquas—and then the second step, a dry plateau known as the Little Karroo. On the north the Groote Zwarte Bergen separate the Little Karroo from the third step, the plateau of the Great Karroo. Most of the country which lies between the great escarpment and the ocean is drained by rivers which rise at the foot of the escarpment or amongst the fold mountains themselves. The Natal rivers flow swiftly in deep valleys, and waterfalls are frequent. Rivers rising amongst the fold mountains of the Cape of Good Hope tend to flow along the valleys between the ranges as far as possible, and then to cut through them by series of great "poorts." Some of the rivers, such as the Great Fish river and Sundays river are important for irrigation purposes.

Geology.—The plateau of South Africa consists of a foundation of very old, hard rocks, which were folded very early in the earth's history, and were afterwards covered by great sheets of sandstone and shale, known as the Karroo System. These beds are, in large part, of freshwater origin, and in some areas contain valuable seams of coal. The Karroo Beds where they rest on the ancient massif are still nearly horizontal and are penetrated by great sheets—also horizontal—of an igneous rock known as dolerite. These masses of dolerite are harder than the sandstones, and so form the flat tops to the hills when the softer sandstones are worn away. Where the flat-topped tablelands have been dissected by weathering, the characteristic conical hills, known as kops or kopjes, result. In the east of the plateau there are sheets of lava poured

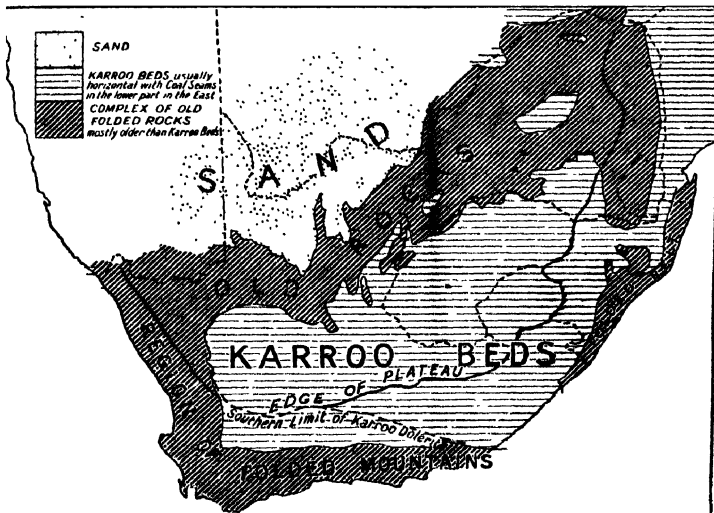


FIG. 320.—Simple geological map of South Africa.

out at the same time as the Karroo Beds were laid down. The plateau has not been folded by earth movements since the Karroo Beds were laid down, but has been raised up by gradual elevation to its present height. At the same time the Karroo Beds have been removed by denudation over large areas and the ancient rocks exposed as in the gold-bearing Witwatersrand and over much of Bechuanaland.

The country between the escarpment and the ocean is different, mainly because it has been folded since the deposition of the Karroo Beds. In the south-west many of the folded mountains in the Cape Ranges consist of the hard Table Mountain Sandstone.

Minerals.—South Africa was until recently almost the only source of diamonds, and produces more than half the world's total

annual output of gold, so that the mineral industry is a very important one.

Gold.—Gold was known to occur in South Africa in ancient times, but the Witwatersrand, the richest goldfield in the world, was not discovered until 1885. From that time to the end of 1934, the Transvaal has produced gold valued at about £1,300,000,000. It is nearly all found in curious beds of rock, a few feet thick, called “bankets.” The rock is a hard conglomerate or puddingstone with pebbles of quartz, and the particles of gold are so small that they can rarely be seen by the naked eye. The banket is a very old rock, and is part of the area of old rocks which has been uncovered by the wearing away of the Karroo Beds.

The annual production in recent years has been roughly 11 million fine ounces, about 300 tons, obtained by crushing some 35–40 million tons of rock. The industry employs over 300,000 people.

The whole economic structure of the Union has been built up on the basis of gold production, and the prosperity or otherwise of the whole community fluctuates with the price of gold in the world's markets, and especially in Britain. In recent years the most noteworthy event was the suspension of the gold standard in 1931 by Britain (and by the Union in 1932). This measure, enhancing the value of the gold output, stimulated mining and enabled the Government to apply much-needed financial aid to the agricultural industries, which were suffering severely from the effects of the world depression, coupled with the drought of 1932–3 and the ensuing heavy rains and disastrous locust plague.

It must not be forgotten, however, that gold is a waning asset; it has been estimated that by 1950 the production will have fallen to one-quarter of the present figure, and although a high-price level for gold may lengthen the life of the mines by enabling poorer ores to be profitably worked, there is little doubt but that increased attention will have to be focused on the base metals and agriculture if the Union is to maintain its present level of prosperity.

Diamonds.—The most famous diamond-field is at Kimberley, in Cape Province, where diamonds were first found in 1871, but the largest single mine is now the Premier Diamond Mine, near Pretoria. The total value of the diamonds produced was, until recently, nearly one-third that of the gold, but working in most areas is temporarily suspended, owing to the large production from newly discovered fields. The earliest diamonds found were alluvial—that is, they had been washed out of the parent rocks. The Kimberley diamonds were found in decomposed rock known as yellow ground, occupying oval or circular patches corresponding to “pans” on the surface. Underneath the decomposed yellow rock is hard rock known as “blue ground” and the momentous discovery of the diamond

industry was the realisation that the blue ground was the parent rock of the diamonds. The blue ground, scientifically known as Kimberlite, is an igneous rock, occupying pipes going down into the earth's crust which may represent old volcanic necks. Large numbers of pipes are known, but only a few are diamond-bearing. In the early days the pipes were excavated to depths of as much as 400 feet before underground mining became necessary. The deep diamond mining is in the hands of a few large companies such as De Beers, Jagersfontein and Premier, which restrict and control the

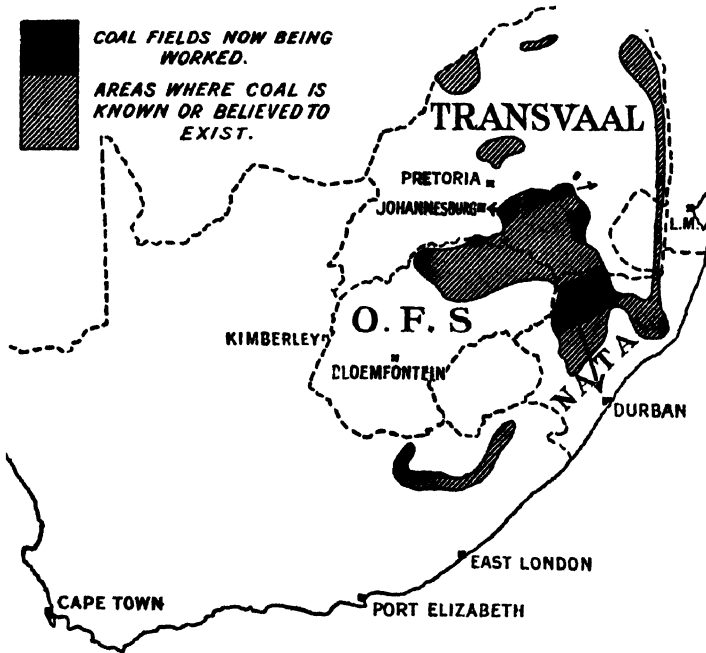


FIG. 321.—The coal-fields of the Union.

The arrows show where the coal is sent from the mines.

output, and the principal mines are near Kimberley, at Jagersfontein, Koffiefontein, and near Pretoria. In the years 1925–27 new discoveries of richly diamond-bearing alluvial deposits were made, especially in South-West Africa, resulting in a huge increase in the output of alluvial stones and temporary cessation of mining. (Production, 1931, 2·1 million metric carats; 1933, 0·5 million metric carats, all alluvial.)

Coal.—Although the value of the coal produced in South Africa is small compared with that of the gold, it is safe to say that it is the presence of cheap coal, in an area devoid of timber or of hydro-electric power, which has enabled many of the gold mines to be

worked at a profit. The coal occurs in the lower part of the great Karroo System, and coal-fields are known in Natal, Transvaal, Orange Free State, Zululand, and Cape Province. The principal fields at present worked are around Witbank and Middelberg in the Transvaal (which supply Johannesburg, the gold-fields, and the

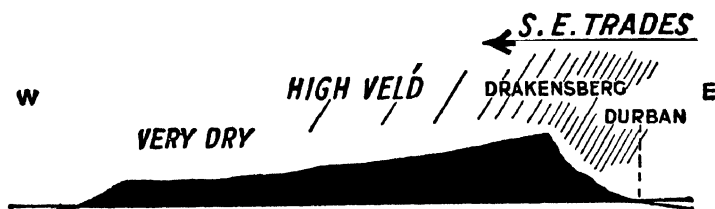


FIG. 322.—Section across South Africa.

Pretoria iron and steel industry), and around Newcastle, in Natal. The Natal coal goes largely to the port of Durban, which not only supplies bunker coal but has a considerable export; it is also used for generating electricity for the railways.

Copper is produced in Namaqualand (Cape), at Messina in the Northern Transvaal, and in South-West Africa. Tin is mined in the Transvaal Bushveld.

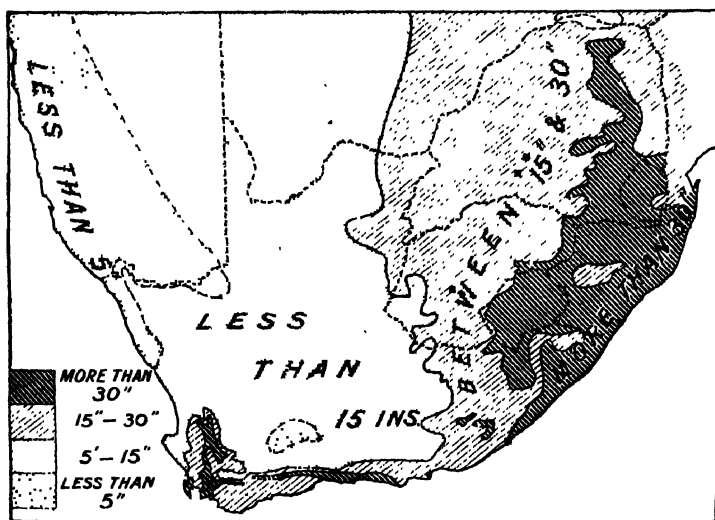


FIG. 323.—Simple rainfall map of South Africa.

Iron ore occurs in huge quantities near Pretoria, and is mined for use in the new iron and steel works there.

Other minerals produced in South Africa are asbestos, chromite, platinum, mica, corundum, manganese, graphite, magnesite and soda.

Torbanite, from which oil can be obtained, is found at Ermelo, in the Transvaal, and a refinery is being established at Boksburg.

Climate.—Certain outstanding features control the climate of South Africa :

(a) The elevation of the plateau lowers the general temperature to the extent of between 10° and 25° throughout the year.

(b) Except in the south-west which receives a winter or Mediterranean rainfall of cyclonic origin from westerly winds, the rain-bearing winds are the south-east Trades. These meet the high eastern edge of the plateau and are there robbed of much of their moisture. The lower western half of the plateau gets very little rain indeed.

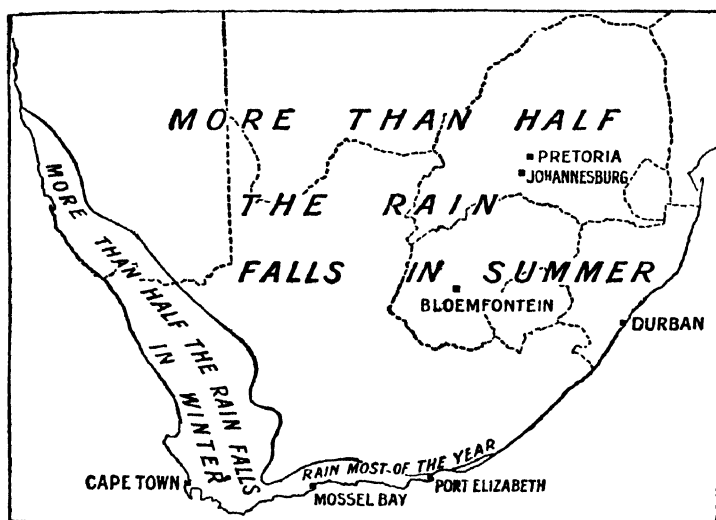


FIG. 324. —The limit of winter and summer rainfall regions.

Climatic Regions.—South Africa can be divided into a number of climatic regions :

On the plateau :

(a) The *Tropical Climate*, giving rise to typical savana or "bush veld," occurs over the northern part of the Transvaal, roughly from Pretoria northwards.

(b) The *Hot Desert Climate*, giving rise to the Kalahari semi-desert, occurs over the western half of the plateau. The rainfall decreases steadily westwards and the 15-inch rainfall line may be taken as the limiting line.

(c) The *Temperate Continental Climate*, giving rise to treeless grasslands, is found over the eastern half of the plateau, south of the tropical region of the Transvaal.

Between the plateau and the sea :

(a) The *Hot Desert Climate* occurs down the west coast in a more extreme form than on the plateau.

(b) The *Mediterranean Climate* occurs in the south-west. Eastwards this region fades very gradually into one with rainfall all the year round. The Great and Little Karroo lie in the south-west, but are cut off from the rain-bearing winds by mountain barriers. Such rain as they have comes mainly in winter and they may be regarded either as having a very dry Mediterranean climate or a desert climate akin thereto.

(c) The *Warm Temperate Climate* (Eastralian type) starts about Port Elizabeth and occurs through Natal, passing gradually northwards into tropical and equatorial regions along the coast.

These climatic regions have been shown in Fig. 326.

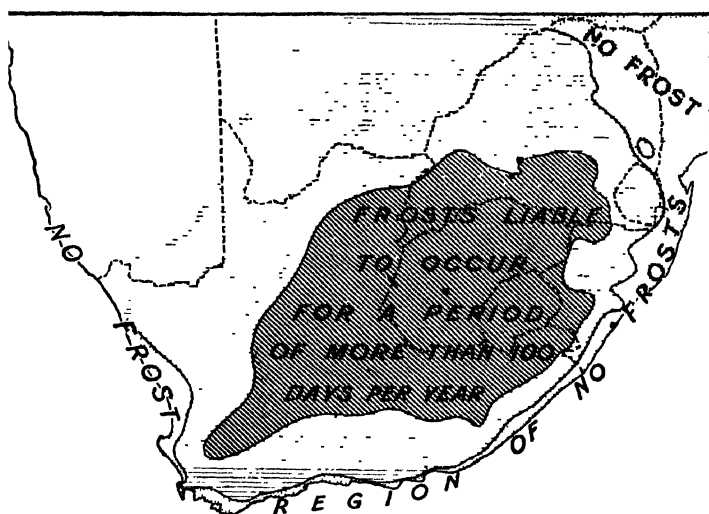


FIG. 325.—Frost map of South Africa.

Natural Vegetation.—In South Africa most natural vegetation is referred to as “veld”—in the same way as “jungle” is used in India or “bush” in Australia. Different kinds of natural vegetation are referred to as different kinds of veld—bushveld (=savana), grassveld (=grassland), thornveld, etc. As would be expected, the vegetation regions correspond closely with the climatic regions shown in Fig. 326.

On the plateau :

(a) *The Transvaal and Limpopo Bush Veld* (savana) consists of grassland with scattered trees and occupies the area with a tropical climate. It commences north of Pretoria and stretches away northwards to the lower and warmer lands of the Limpopo Valley, where frosts and cold winters are rare.

The vegetation of the Limpopo Valley forms part of what is sometimes called the "Low Veld."

(b) *The Kalahari Bush Veld* occupies a very large area in the dry heart of the plateau, and covers the greater part of Bechuanaland. As its name suggests, it is a very dry type of savana, with scattered spiny bushes and a very little grass. The *Namaqualand Vegetation*, in which the still smaller shrubs and succulent plants are separated by patches of bare rocky soil, occupies the driest, western part of the plateau. South of the Kalahari and Namaqualand lies the *Upper Karroo*, consisting of vast treeless plains. There is a sparse covering of low shrubs and bushes, but little or no grass.

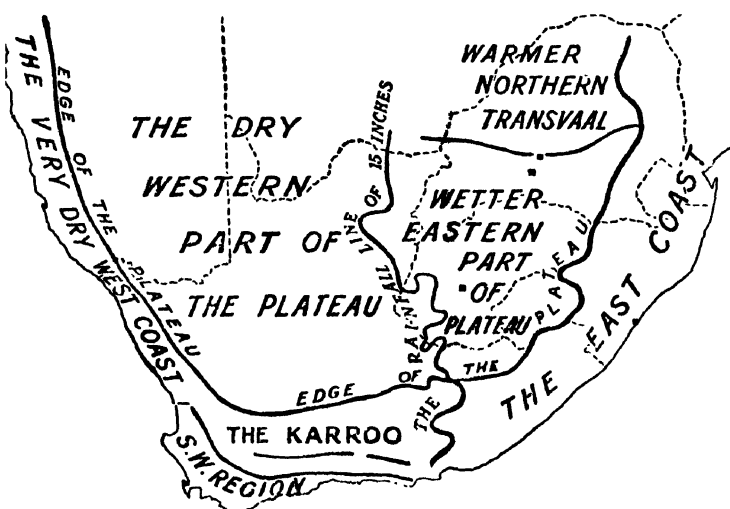


FIG. 326.—Climatic regions of South Africa.
Compare this map with the Physical and Rainfall maps.

(c) *The High Veld* is a typical, treeless, temperate grassland, and corresponds to the area with the temperate continental climate and thus occupies the southern part of the Transvaal, the Orange Free State, and Basutoland. In Basutoland the monotonous scenery of the normal High Veld is varied by hills, and thorny bushes appear in the rocky parts. Elsewhere, this region of hot summers, and dry cold winters with severe frosts, has no trees or bushes but those planted by man.

On the coastal tracts :

(a) *The Namib* is a strip of true desert which occurs down the very dry west coast. The land consists mainly of shifting sand dunes. With from one to five inches of rain per year it is often very difficult for plants to live at all, and often only scattered tufts of grass or a few succulent plants are to be found.

(b) *The South-Western Scrubland* or the *Cape Mediterranean Vegetation* occupies the region of winter rainfall in the south-west of the Union. Most of the valleys are fertile and cultivated, but the hill-slopes are covered with a vegetation of shrubs, usually from one to six feet high, with small leathery leaves and often a grey-green foliage. There is very little grass. In damper, more sheltered situations patches of forest occur. As one goes eastwards along the coast the summer drought becomes less and less marked. In this area, especially around Knysna,

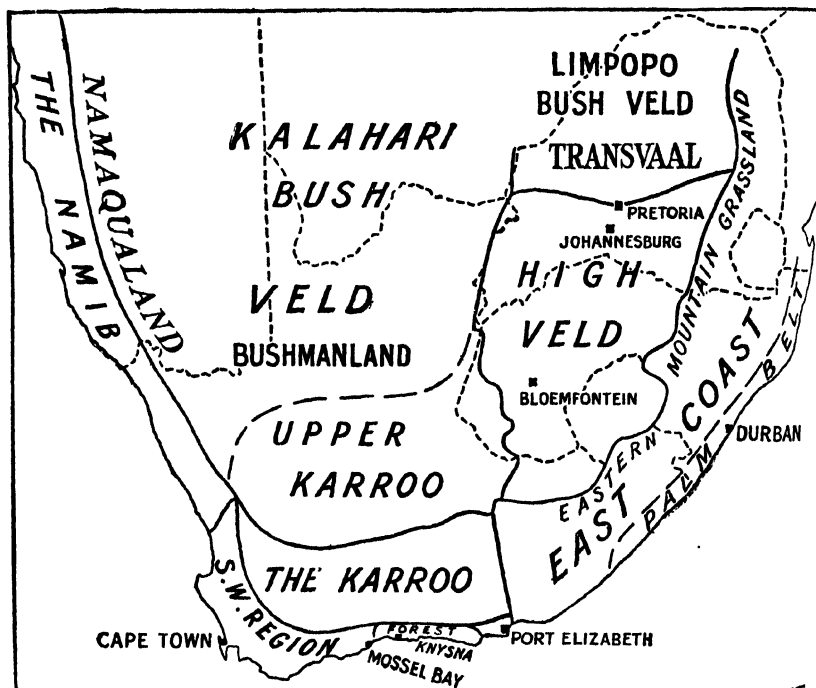


FIG. 327.—The natural vegetation and natural regions of South Africa.
Compare this map very carefully with the last one, showing the climatic regions.

there are still some fine forests in which trees with valuable timber, such as the yellowwood and stinkwood, grow. If we include this forested part, the Cape Mediterranean vegetation extends roughly as far as Port Elizabeth. Many foreign trees flourish in the Mediterranean region—especially pines, oaks, and eucalypts.

The Karroo Vegetation is a semi-desert vegetation of small shrubs and succulent plants, not usually exceeding two or three feet in height. Trees and bushes are typically absent. Usually dull and uninteresting, after rain the Karroo produces

a wealth of flowers. The Karroo extends roughly as far east as the 15-inch rainfall line.

(c) *The East Coast Vegetation* occupies the coast from Port Elizabeth right through Natal. Three belts may be distinguished :

- (1) *The Palm Belt* of semi-tropical plants occurs along the coast where there is an absence of frost. With a hot, wet summer the usual vegetation is a dense bush of palms, wild bananas, or a forest of varied trees.
- (2) *The Eastern Grassveld* or *Thornveld* lies between 1,000 feet and 4,000 feet, and stretches from the Palm Belt to the foot of the escarpment. The ground rises by terraces and is covered by grassland with scattered bushes.
- (3) *The Eastern Mountain Grassveld* and *Eastern Mountain Forests* occupy the eastern slopes of the escarpment mountains.

Forests and Forestry.—South Africa cannot be described as a country rich in natural forests. Forests cover only about one two-hundredth part of the Union, or 0·5 per cent. The natural forests occur in three main areas :

(1) The Cedar Forests occupy a small area in the Cedarberg Mountains of the south-western area (north of Cape Town).

(2) The Yellowwood and Broad-leaved Forests occupy the seaward slopes and ravines of the mountain ranges of southern and eastern South Africa from the Outeniqua Mountains to the north of Natal. The finest forests are around Knysna in that part of the south-western region which enjoys rain through most of the year. They require a rainfall of from 35 to 70 inches. Besides the yellowwood (*Podocarpus*) there is the fine stinkwood, formerly much used for furniture, the ironwood, the assegai wood, and the pear woods.

(3) The Sub-Tropical Forests of the coasts of the Transkei, Pondoland, and Natal. These forests yield several varieties of fine hard timber.

Foreign trees have been planted in many parts of the country, especially by mining companies, by farmers, towns, and the Government. The most important are :

(1) Various Australian eucalypts (gum-trees) which grow very quickly—70 or 80 feet in seven years—and give good hard wood unless growth is too rapid.

(2) Wattle trees from Australia. The bark of the black wattle is used for tanning leather, and the timber for pit-props.

(3) Various kinds of pines from the Northern Hemisphere, giving wood suitable for box-making.

The planting of trees, especially over the formerly treeless plains of the High Veld, has made a very great difference to the scenery.

Many bare, rocky regions, like the northern suburbs of Johannesburg, have now become pretty and attractive with a wealth of pine and gum-trees. South Africa is not yet self-supporting as regards timber, and still imports large quantities of hard woods for railway sleepers from Australia and soft woods for building and box wood. The present afforestation policy, however, should render the country self-supporting in 15 or 20 years' time.

Agriculture.—Apart from the mining of gold and diamonds, farming is by far the most important occupation in South Africa. Yet only about 5 per cent. of the Union is under the plough, and 12 per cent. is the absolute maximum that could ever be cultivated. The handicaps to agriculture are many: the irregularity of the rainfall, with periodical droughts (*e.g.* 1932-3), soil erosion due to the torrential and seasonal character of the rain, locust plagues (*e.g.* 1934), and the necessity for relying on rather costly rail transport, there being no waterways. For a long time agriculture has been subsidised in the Union to a greater or less extent. The original policy was to foster grain-farming by protection, but it came to be realised that in this type of agriculture the Union could not possibly compete with *e.g.* Canada and Argentina. Thus there is now an increased emphasis on animal and fruit-farming. Some £10 millions per annum are spent by the Government on wheat, sugar, citrus fruit and other subsidies and protective measures, and yet the total value of the agricultural produce is only about £60 millions! It is only economic to do this because of the large revenue derived from the gold industry.

Irrigation is not yet much developed, and intensive farming, such as is practised in the thickly populated parts of Europe and North America, is only in its early stages. The distribution of many crops is limited to certain natural vegetation regions.

Maize (Indian corn or mealies).—Maize is the principal grain of the Union. Not only does it form the staple food of the greater part of the population (excepting only the Europeans) but it also affords excellent food for cattle and considerable quantities of the grain are exported. The principal maize-growing area of the Union, often known as the "Maize Triangle," lies on the High Veld (see Fig. 328) in the Southern Transvaal and the northern part of the Orange Free State. This area produces between one-half and two-thirds of all the maize grown in the Union. Most of the remainder is grown in the East Coast region. Maize cannot resist drought and so is not found where the rainfall is less than 15 inches. Compared with other maize-growing countries the yield of grain per acre in South Africa is small. It is rather less than three bags of 200 lbs. each per acre, whereas in the United States it is eight bags. In Natal the yield is higher than on the High Veld. When land becomes scarcer it will be necessary to improve the yield by fertilising, etc., but at

present plenty of land is available. As a food for cattle the grain is often used, but a fine succulent food is prepared by cutting the maize before the cobs are ripe, stacking it in a shed and allowing it to ferment slightly. The resulting ensilage, as it is called, has lost some of the natural moisture of the maize stalk freshly cut, but forms a fine cattle food. The production of maize in the Union during the last 12 years has varied from 2.2 to 4.8 million lbs., averaging about 3.8 million lbs. or 19,000,000 bags (1,730,000 metric tons), *i.e.* only about one-fiftieth of that of the United States.

Wheat.—South Africa is not a great wheat-growing country, but it grows nearly enough for its own needs. The wheat is nearly all

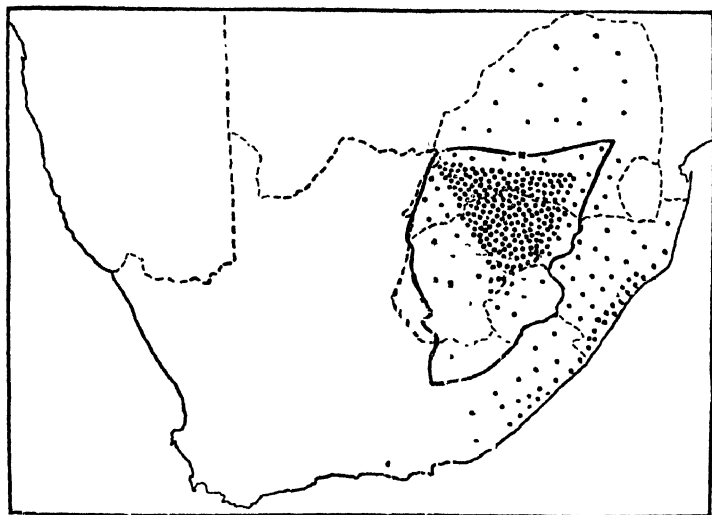


FIG. 328.—Distribution of maize.

Each dot represents a production of 50,000 bags in a good year (*e.g.* 1928-29). The thick black line shows the limits of the High Veld. Notice that the "Maize Triangle" lies in the wetter, eastern part of the High Veld. (Note one bag = 200 lbs. or 3½ bushels.)

grown in the south-western region during the winter months, when the rain falls, and is harvested early in the summer. Associated with wheat are the other "winter cereals," as they are called in South Africa—rye, oats, and barley. Of these the Union produces sufficient for its needs.

Kaffir Corns or Sorghums.—Kaffir corns of various kinds are very largely grown throughout the Union by the natives, but are little cultivated by European farmers. They are better suited to the drier western parts of the plateau than is maize. There are several different kinds, one of the best is a native of South Africa, but has been improved by careful cultivation in America. Kaffir corn is used both as a grain and as a forage crop and is also used for the manufacture of Kaffir beer.

Sugar.—The sugar cane, essentially a tropical or sub-tropical crop, is limited in South Africa to the warm coastal strip of Natal and especially Zululand (Fig. 329). Natal is able to produce much more than the total amount of sugar required by the Union, and the surplus is exported. The industry is protected by a heavy tariff on imported sugar.

Fruits.—The fruit-growing industry of the Union is now a very important one and is rapidly increasing. In fact, fruit may be said to play second part to gold in the agricultural and industrial life of the Union, by reason of the many secondary industries, *e.g.* drying, canning, wine-making, to which it gives rise. The fruits grown may be grouped into four classes :

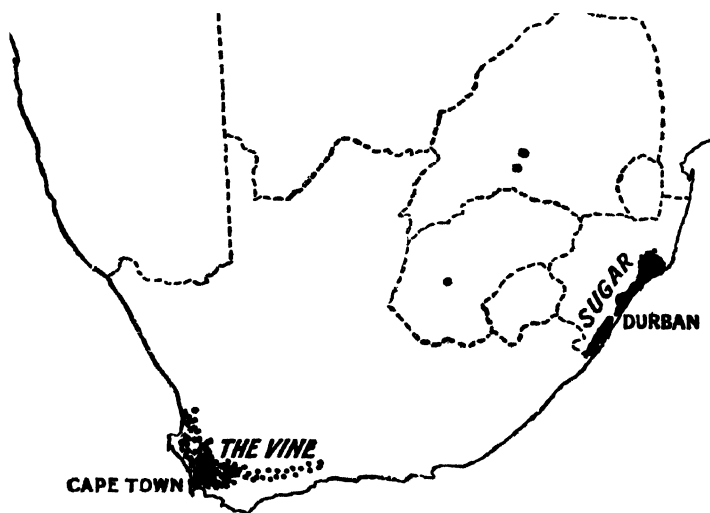


FIG. 329.—Distribution of sugar cane and the vine.

The sugar cane grows only in the coastal strip (sub-tropical) of Natal; the vine is almost restricted to the Mediterranean Region.

(1) Citrus Fruits—oranges, naartjes or tangerines, lemons, and grapefruit.

(2) Deciduous Fruits, *i.e.* fruits from deciduous trees, trees which lose their leaves in the cold season—apples, pears, peaches, apricots, nectarines, plums.

(3) Grapes.

(4) Tropical or Sub-Tropical Fruits—bananas, pineapples, melons, mangoes, papaws, guavas, granadillas.

Owing to the fact that the seasons are reversed in South Africa when compared with Europe, fruit ripens in the Union when it is practically unobtainable in England, so that South Africa has great opportunities in the export trade to England. Some 220,000 tons of fresh fruit are exported every year—over 90 per cent. to Britain

Citrus Fruits are now grown successfully in several areas of the Union, but they require warm, sheltered positions and so we find them limited to three of the regions of natural vegetation :

(a) The South-Western region, especially in the valleys near Cape Town and around Port Elizabeth.

(b) The Sub-Tropical East Coast region around Durban.

(c) The Northern Transvaal, especially in the warmer eastern part.

Deciduous Fruits have long been grown successfully in the early settled south-western region of the Cape, which is still the most important region. There are also many apple and pear orchards on the High Veld, throughout the Orange Free State and the Southern Transvaal.

Grapes.—All the vineyards of South Africa are in the sheltered valleys of the Mediterranean region. Not only are grapes grown for eating and for export, but considerable quantities are dried as raisins and currants and quantities of wine and brandy are made. The wine industry has had a phenomenal growth since the Great War, despite the absence of any subsidy and in the face of severe Australian competition. There is now an export trade of nearly 2 million gallons a year.

Tropical Fruits are limited to the sub-tropical coastal strip around Durban.

South Africans eat large quantities of fruits but every year now sees larger quantities being sent abroad. The most important exports are of oranges, pears, grapes, peaches, plums, grapefruit and pineapples (in order of value). Large quantities of fruit are now canned, bottled or dried, both for home use and for export.

Tobacco is grown in a number of different parts of the Union, on the High Veld, South-Western region, and in Natal. On the High Veld and in the South-Western region the warm temperate type used for cigarettes and pipe mixtures is grown, whilst in Natal the tropical type used for cigars and cheroots is cultivated.

Cotton is a crop which has only recently become of importance. It is a sub-tropical crop, and so is almost limited to the Northern Transvaal, Natal, and Zululand.

Tea can be grown in Natal, but it is less important than formerly, as it is cheaper to import tea than to grow it.

Livestock.—*Sheep*. The breeding of sheep for the sake of their wool is the oldest and the most important of all the agricultural and pastoral industries of the country, but its world importance dates only from its rationalisation during this century. There are 30-40,000,000 sheep in the Union.

Sheep are well distributed except in the wetter parts of Natal and the Northern Transvaal. The High Veld is, however, the most important region. The original Cape sheep were inferior, but the

importation of sheep from England and Holland and, during the present century, from Australia has improved the stock immensely. The best wool is obtained from the Merino sheep, but the hardiest sheep for the driest regions (such as South-West Africa) is the Karakul sheep, whilst the fat-tailed Cape sheep gives the best mutton. On an average a flock of Merino sheep yields about 11 lbs. of wool per sheep, and South Africa is one of the five great wool-producing countries of the world. Exports vary between 250 and 300 million lbs., worth in recent years between £6,000,000 and £16,000,000. France, Britain and Germany each take about a quarter of the exports.

Goats.—Goats are able to live on the poorest vegetation where even sheep will not thrive. Consequently they are found in large numbers (6 millions) in the dry parts of the Cape Province. South Africa leads in the world's production of mohair, obtained from the long-haired Angora goat, which was originally introduced from Asia Minor; but the industry is declining. In 1923 there were 2·2 million Angora goats, in 1935 only 0·7 million. The ordinary Cape goat is of value for food in the driest regions.

Cattle.—There are about ten million cattle in the Union of South Africa, and the last few years have marked not only a very rapid increase in numbers but a great improvement in quality. It must still be remembered, however, that amongst the natives cattle are regarded as tokens of wealth rather than as food-producers. Cattle are bred mainly for three purposes:

(1) As draught animals. Although the old-fashioned trek waggon with its half-dozen pairs of bullocks, on which the early European settlers had to depend for transport, has largely disappeared with the spread of the railway and the motor-car, much of the ploughing is still carried out by oxen. The early settlers gradually created a distinct breed of cattle capable of standing long treks, a breed known as the Afrikander.

(2) For the production of beef. Fine natural cattle-ranching country is found in the Northern Transvaal, Bechuanaland, etc., in the various regions of Bush Veld, but very large numbers of cattle are kept on the High Veld and the natural grassland feed is supplemented by various specially grown fodder crops. The quality of the beef has been greatly improved of recent years by the importation of first quality stock from Great Britain and Holland.

(3) For the production of milk, butter and cheese (dairy-farming). This industry has also grown rapidly in recent years; the natural cattle country is in the wetter regions of the east coast, but fodder-fed dairy cattle are kept over most of the High Veld.

We should notice that in many of the dry districts of the Karroo and the High Karroo there are practically no cattle, though sheep are able to thrive there. The map, Fig. 330, illustrates this. In

connection with the cattle industry we must notice the various fodder crops. Maize, Kaffir corn, peas, beans, and monkey-nuts are all grown for this purpose and especially for ensilage. For the preparation of ensilage, deep pits are dug and filled with layers of the green fodder crops, with a little salt. The pits are then covered over and the contents allowed to ferment. Part of the moisture dries out and the resulting ensilage can be cut by a chaff-cutter.

Cattle, sheep, and goats are also very important for the hides and skins which they yield; there is a valuable export trade in these commodities.

Horses, mules, and asses have been introduced into South Africa

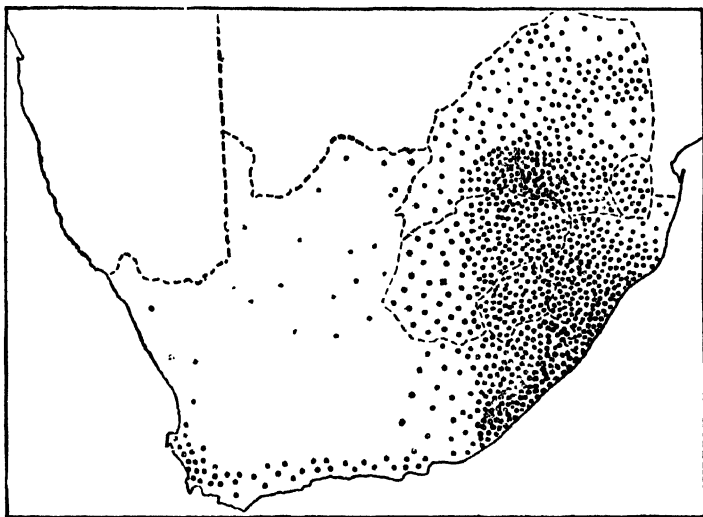


FIG. 330.—Distribution of cattle.

Each dot represents approximately 10,000 head of cattle.

by Europeans. Except in times when there are scourges of horse-sickness, they have proved extremely useful in South Africa, and mules especially have proved more hardy than cattle for trekking in dry country. Transport by mule- or donkey-drawn waggons is still important in the dry parts of the Cape Province.

Pigs.—The bacon industry has made good progress during the last few years. There are nearly a million pigs, mostly in the Transvaal and Cape regions.

Poultry.—There are good opportunities in South Africa for the development of poultry-farming. This industry progressed rapidly and a very considerable export trade in eggs was established, but the high cost of maize and wheat has had a bad effect.

Ostriches.—For several years before the Great War, the production of ostrich feathers was an important industry, centred

mainly in the Little Karroo around Oudtshoorn, and the value of the feathers was between two and three million pounds annually. But women's fashions change, and the demand for ostrich feathers has almost disappeared.

Irrigation.—A large proportion of the Union of South Africa receives a small rainfall of less than 15 inches. Moreover, the rainfall from year to year is often very irregular and severe droughts may occur for two or more years in succession. Consequently irrigation is a matter of great importance. Although the Union has not, so far as we know at present, any large artesian basins such as are found in Australia, there is often a good supply of water at small depths below the surface, which can be reached by boreholes and pumped up to the surface by windmills. In this way a large number of farms have their own water supply, especially over the Karroo and High Veld where water is badly needed for watering stock. There are a few small rain-catchment dams as well as a number of river dams. The more important of the latter are :

Hartebeestpoort Dam (Crocodyle River), north of Pretoria.

Sundays River, north of Port Elizabeth.

Kamanassie River, near Oudtshoorn.

Tarka River (tributary of the Great Fish River), near Cradock.

Great Brak River, near Fish River Station.

Altogether about a million acres are irrigated by canals in the Union, a very small area in comparison with that of agricultural lands as a whole.

An interesting system employed in South Africa is that known as "warping" or "Zaaidams." Flood water, rich in alluvium, is allowed to spread over the land, and the deposit of silt is then ploughed in.

Dry Farming.—The system known as "dry farming" makes it possible to utilise land for crops which would otherwise be too dry. The main principle is to plough the land very deeply and then to cover the surface with a "blanket" of dry soil, which has the effect of preventing the underlying soil from losing its moisture. It has not yet been practised to the same extent as in Canada or Australia.

Fisheries.—The southern shores of South Africa have valuable and extensive fishing areas. The industry is carried on in the neighbourhood of the Cape Peninsula, False Bay, Mossel Bay, The Agulhas Bank, and Algoa Bay. The Agulhas Bank promises to be one of the finest and most prolific fishing grounds in the world. The industry is as yet little developed, but crayfish are exported to France.

The *whaling industry* is carried on round the South African shores, the most important stations being in the neighbourhood of Durban.

Manufactures.—One of the most important recent develop-

ments in South Africa is the growth of manufacturing industries. The leading industrial regions are the Witwatersrand goldfield around Johannesburg ; the south-western region around Cape Town and Port Elizabeth, and in Natal at Durban and on the coal-fields.

The value of the manufactured goods is roughly £100 millions per annum, but apart from this the industries are of exceptional importance as offering employment to the growing numbers of "poor whites" who have been displaced from agricultural activities through economic causes and mechanisation.

TABLE OF EMPLOYMENT IN SOUTH AFRICA.

	Industry (1932-3)	Agriculture (1930)	Mining (1934)
Total	192,000	749,000	367,000
Europeans	45%	25%	11%
Natives	39%	63%	} 89%
Asiatics	4%	2%	
Other coloured	12%	10%	

Population. The white population of South Africa has descended from Dutch, English, and French settlers, with a very small infusion of Portuguese, German, and other European races. The Dutch in early days severed their connection with their mother country and the Dutch language as used in South Africa suffered many changes. Afrikaans, the South African form of Dutch, varies widely from ordinary High Dutch. When the Union was formed in 1910 both English and Afrikaans were recognised as official languages. English predominates in Natal and the town districts of the Transvaal, but Afrikaans is the principal language amongst the farming community of the O.F.S. and the Transvaal. In Cape Province the usual rule is English in the towns, Afrikaans in the country districts ; but it is the policy of the schools to make all South Africans bilingual. 65 per cent. of the white population can speak Afrikaans.

The peoples now living in the Union of South Africa may be classified under four main heads : (1) Europeans. (2) Coloured (mixed). (3) Natives. (4) Asiatic.

This is the classification officially adopted, and below are the numbers at the last full census (1936) :

	European	Coloured	Native	Asiatic	Total
Cape	791,394	681,831	2,045,110	10,692	3,529,027
Natal	190,551	18,513	1,553,030	183,646	1,946,610
Transvaal	820,620	49,908	2,445,045	25,561	3,341,144
O.F.S.	200,947	17,722	553,156	29	771,854
Union	2,003,512	767,984	6,597,241	219,928	9,588,655

Natives.—The Native population is now almost entirely restricted to the eastern and northern parts of the Union. This is important,

because whereas in the temperate regions of the south the climate is suitable for white labour, cultivation in the warmer districts of the north and east must depend largely upon Native labour. The great mining district of the Rand also depends on an adequate supply of Native labour, drawn to some extent from Portuguese East Africa.

The natives are mostly Bantus and include such widely different races as Matabele, Zulu, Basuto, Bechuana, Barotse, Swazi, Griqua, Xosa (Kaffir), etc. Amongst the most noteworthy are the Zulus who inhabit the fertile and productive east coast. They are powerfully built and intelligent people, and it is for this reason that they have been able to hold the best lands.

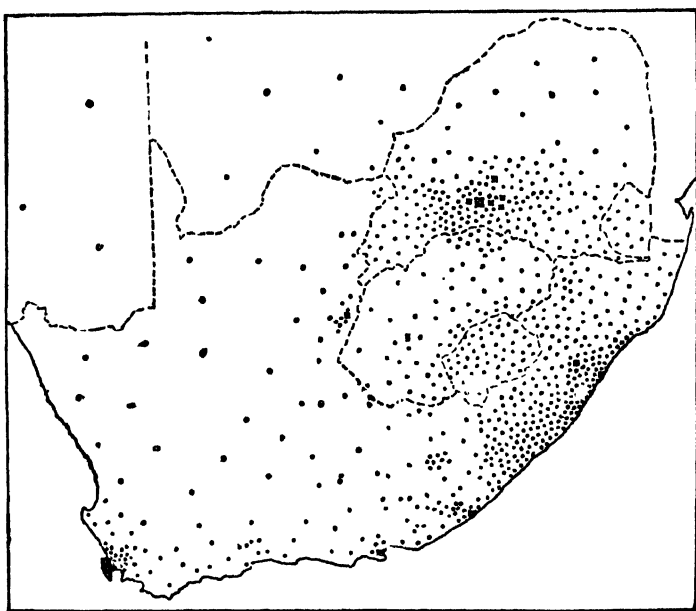


FIG. 331.—The population of South Africa (all races).

Each dot represents roughly 10,000. All towns with more than 10,000 people are marked by a square dot.

Among the non-Bantu native races the most interesting are the Hottentots of the south-eastern coastal belt and the Bushmen. The latter are very primitive, small in stature, and weak in warfare. They have been driven by stronger tribes to the inhospitable borderland of the Kalahari Desert, and are tending to die out.

Mixed or Coloured.—As a result of the intermarriage of the white settlers and the Native races a large mixed population has arisen, usually known as “Coloured persons.” They are especially numerous in the south-western districts around Cape Town. Other coloured persons are of Hottentot-Kaffir or Hottentot-Malay parentage.

Asiatics.—The Asiatic population consists almost entirely of

Indians and Malays. The larger number of Indians were brought to South Africa to work on railway construction and in the tropical plantations of the east coast. Many of them have settled and have been followed by many of the trader class.

The native and coloured races of South Africa are of the greatest importance economically; for not only do they provide cheap labour of the unskilled and semi-skilled types, but also, as they outnumber the Europeans by about four to one and are steadily increasing, afford a large local market. Under the influence of European peoples the native and coloured peoples show strong desires to attain a higher standard of living—a tendency which greatly increases the importance of the local market.

A great problem is presented by the growth, during the last quarter of a century, of an ever-increasing body of white people not belonging to the land-owning or professional classes. These people, numbering at present some 300,000, are mainly located in the Rand.

Communications.—South Africa is well served by an excellent railway system. The first railway (from Cape Town to Wellington) was commenced in 1859 and there are now over 13,000 miles of railway in the Union. The railways and harbours are owned and controlled by the Union Government, being administered by a special department. The railway gauge is 3 feet 6 inches, and South Africa is an example of the excellent result which can be achieved with a narrow gauge. Fig. 332 shows the position of the principal lines. Notice first of all the position of the four main ports of the Union—Cape Town, Port Elizabeth, East London, and Durban, and also of the Portuguese port of Lourenzo Marques which serves the eastern Transvaal. Notice next how these ports are connected with the leading towns of the Orange Free State and the Transvaal. From Cape Town there is a long main line through the Bechuanaland Protectorate to the town of Bulawayo in Southern Rhodesia, where it links with the Rhodesian railways. This line runs through Kimberley and has an important branch to Johannesburg. The railways of South-West Africa were connected with those of the Union in 1915 in the early days of the Great War.

It is a great advantage to South Africa that the railways and harbours are under one control. The railways are able to make special arrangements for taking coal from the collieries right to the sides of steamers in the harbours. Again, the railways have constructed a series of maize elevators in the maize-growing districts and at the ports to enable the farmer to ship his produce more cheaply and easily. Electrification of the railways has been commenced, notably in Natal, which has now one of the largest stretches of electrified *main* lines in the world, and in the Cape Town and Johannesburg districts. Over 500 miles of line are now electrified.

Airways are developing, and in addition to the bi-weekly Imperial Airways Durban to London service, there are several local airways in the Union.

Harbours.—Most of the foreign trade of the Union passes through the four leading ports and through Lourenço Marques; the trade of the minor ports (Mossel Bay, Port Nolloth, Simons-town, Knysna, Port St. Johns, etc.) is less than 1 per cent. of the whole. Fig. 332 shows diagrammatically the proportion of the import and export trade passing through the chief ports. Cape

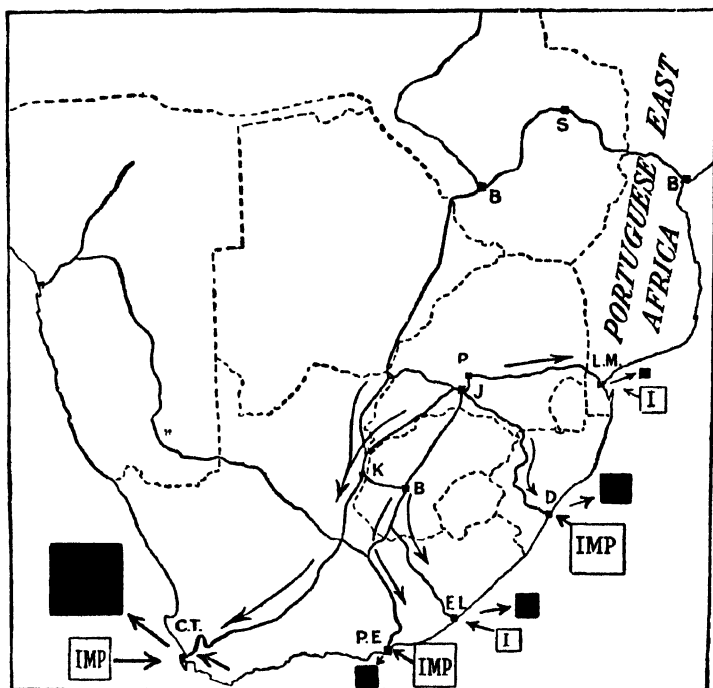


FIG. 332.—Main railways and ports of South Africa.

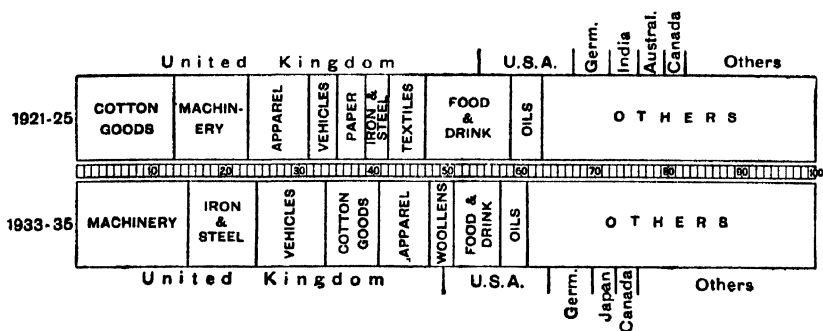
Over 3 million tons of cargo are handled yearly by the ports.

Town, Port Elizabeth, and Durban share the import trade in roughly equal proportions (Durban leading), but Cape Town leads easily in the export trade and two-thirds of the whole of the Union's exports pass through Cape Town.

Cape Town.—Cape Town serves as the outlet not only for the western part of the Cape Province, but for a large part of the whole Union and Rhodesia. Diamonds from Kimberley and the gold of the Witwatersrand are sent through Cape Town. A large maize storage elevator has been built, and the harbour is equipped with a dry dock. Before the construction of the harbour Table Bay did not afford sufficient protection to ships when the north-westerly winds

were blowing, and many wrecks occurred in the old days, so that an artificial breakwater was commenced as long ago as 1860.

Port Elizabeth Harbour is situated on the shores of Algoa Bay. The ships used to anchor out in the Bay and were loaded or off loaded from lighters, but extensive harbour works now enable ocean steamers to be berthed alongside the quays.

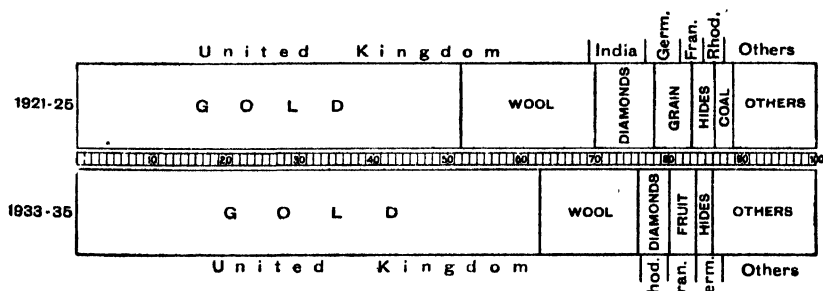


FIGS. 333 and 334.—Union of South Africa : Imports.

Average value 1921-25, £77 millions ; 1928-31, £70 millions ; 1933-35, £60 millions.

East London Harbour is situated at the mouth of Buffalo River, the entrance being protected by breakwaters.

Durban Harbour or *Port Natal* consists of a sheltered bay with a narrow entrance. The entrance suffers from the presence of a sand bar, and constant dredging is required to keep the entrance



FIGS. 335 and 336.—Union of South Africa : Exports.

Average value 1921-25, £60.1 millions ; 1928-31, £87.4 millions ; 1933-35, £65.8 millions.

clear. Durban has up-to-date coaling plant, a modern maize elevator, and a large floating dock.

Foreign Trade of South Africa.—This is illustrated in Figs. 333-336.

CAPE PROVINCE

The South Western or Mediterranean Region.—The first part of South Africa to be colonised by Europeans was that part

which has a climate closely comparable with the home of so many European and Asiatic civilisations—the Mediterranean climate.

The region is on the whole a mountainous one and consists of ranges of mountains enclosing sheltered and fertile valleys in which the population is concentrated. Most of the mountains are built up of a hard, resistant series of sandstones, called the Table Mountain Sandstones, from the fact that they build up the well-known Table Mountain. The region as a whole is bounded on the landward side by a series of ranges the most important of which from north to south are the Cedarberg, Bokkeveld, Hex River Mountains, the Langebergen, and the Outeniqua Mountains. These ranges cut off the south-western region from the dry Karroo.

The mountain scenery in this part of South Africa is magnificent. There are long, sinuous passes between lofty mountain-barriers. Down these passes run river courses almost dry in the rainless season but filled with roaring surging cataracts and flood waters in the wet season. The railways communicating with the interior follow these passes and thus we find steep gradients near the coast. One of the most celebrated passes is the Hex River Valley. When floods occur, washaways on the railways are frequent.

Fig. 337 shows the proportion of land under 1,000 feet. In the northern part the land tends to be lower and the region extends as far as Oliphants River.

The climate is characterised by winter rain, but eastwards towards Port Elizabeth the influence of the Trade Winds is felt and rain falls practically throughout the year. This area might be considered as a sub-region. The rainfall varies greatly over the whole region; for example, at Cape Town it is only 20 inches at the Royal Observatory, but over 70 inches on Table Mountain. The average temperature of Cape Town is 62 degrees—roughly the same as Naples. Frost is rare on the lowlands, but snow frequently falls on the mountains.

The natural vegetation consists of shrubby plants with a wealth of flowers, covering the mountain slopes; the valleys are almost entirely cultivated. Forests grow in the damp “kloofs”; in the wetter regions round Knysna fine natural forests still exist. The sheltered valleys are famous for their fruit orchards and vineyards. Though originally introduced by the early Dutch settlers, viticulture and fruit-farming undoubtedly owe their development and success to the application of the French Huguenots, who, after the revocation of the Edict of Nantes (1685), settled in South Africa. The fertile valleys of the Berg River, Breede River, and Hex River are eminently suited to this type of farming. The neighbourhoods of Paarl, Wellington, Worcester, Stellenbosch, French Hoek, Montagu, and the Constantia District of Wynberg (Cape Peninsula) are noted for their trim vineyards and fruit orchards. Wheat is the

principal cereal. Mixed farming has been carried on by Europeans from early days, and most of the available land is tilled.

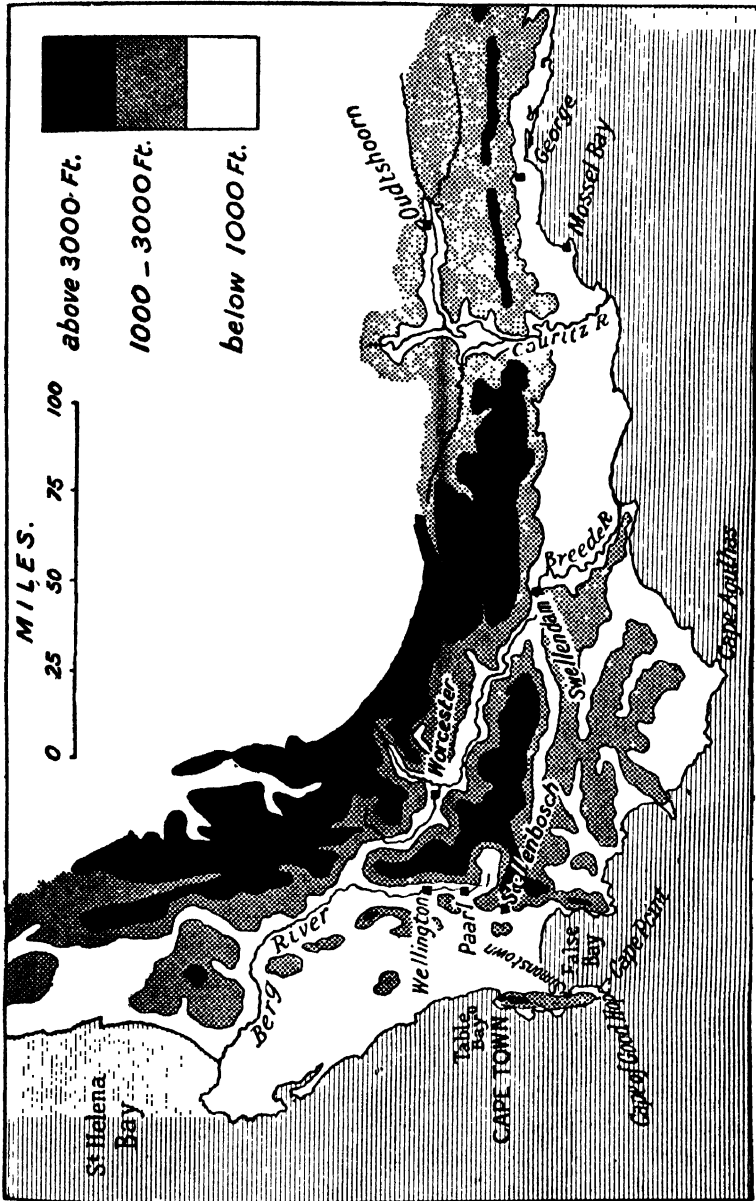


FIG. 337.—The Mediterranean or south-western region.

The fruits already mentioned as produced in this district give rise to many industries. First of all there is the exportation of *fresh fruit*. As the crop is ripe at a time when these fruits are not in

season in the Northern Hemisphere, there is a great demand for them in European and American markets. Grapes, peaches, apricots, oranges, naartjes, plums, pears, and figs are exported in large quantities. Owing to the perishable nature of these fruits and the long distance they have to be transported, it is necessary to preserve them in cold storage. So rapid has been the development of this trade that steamers calling at Cape Town, from which most of the fruit is exported, have had their cold-storage capacity increased. In spite of this fact, fruit has frequently to be detained at Cape Town owing to lack of cold-storage capacity. Fruit of similar kinds is exported from the "Mediterranean" regions of Australia; but, as the journey is considerably longer, South Africa possesses a great advantage. The fruit for export purposes is specially selected and in the case of grapes especially careful pruning, trimming, and selecting are necessary. The *drying of fruits*—especially apricots and raisins—is becoming important, and great developments are possible in this direction. The *manufacture of wines and brandies* is carried on on a considerable scale. The use of French names for the wines is prohibited, but a large export trade is developing, mainly with Britain, where Empire wines are being popularised.

Tobacco grown in this region is locally manufactured. The chief factories are in Cape Town, where large quantities of cigarettes and pipe tobacco are turned out. Some of the tobacco used in these factories, however, is grown in the Transvaal (Magaliesberg) and Southern Rhodesia.

The olive could be extensively cultivated in this district, and a little *olive-oil* is manufactured in Paarl. In Cape Town, as well as in some of the Eastern Province centres, various forms of *leather goods* are now manufactured, especially *boots and shoes* and *harness*. There is still, however, a large import from Europe and the U.S.

Cape Town.—Cape Town is the largest town and the legislative capital of the Union of South Africa. Notice its fine position on Table Bay sheltered by Table Mountain. It has an important university; it is the starting-point of the South African Railway system, and there are important railway works at Salt River a few miles from Cape Town. Cape Town is one of the leading ports, and has a well-equipped harbour, with a dry dock, maize elevator and storage sheds. It is the natural outlet for the region; it is the nearest large port to England, and remains the port of call for steamers *en route* for Australia. The population is over 295,000, of whom 151,000 are Europeans; the non-Europeans are mainly "coloured persons," only a few being Natives.

The rocky Cape Peninsula is separated from the mainland mass by a flat area of sand dunes often called the Cape flats. To the north is Table Bay, to the south is False Bay. False Bay is protected from the north-westerly winds. Along its shores are many

delightful seaside resorts, such as Muizenberg and Somerset Strand. On the shores of the bay is situated the small naval base of Simonstown. *Stellenbosch* is situated in a delightful valley surrounded by mountains. It is a university town, and a religious and cultural centre of the Afrikaans-speaking people. *Wellington*, *Paarl*, *Stellenbosch*, *Swellendam*, and *Worcester* are all the natural centres of the fertile valleys in which they stand and act as collecting centres for the local produce. The position of Worcester in particular should be noted ; it lies at the foot of the Hex River Valley. *Mossel Bay* lies in a sheltered bay and commands two passes across the Outeniqua Mountains into the interior, and so is the outlet for the fertile valleys around Oudtshoorn. *George* is a fruit-growing centre, whilst *Knysna* lies in the forested region. *Uitenhage*, at the western end of the region, is an important centre for the citrus-growing industry. Considerable areas of rich land have now been irrigated from the Sundays River, and the district is progressing rapidly. Situated on Algoa Bay, *Port Elizabeth* is the natural outlet of a large area of South Africa, including the Orange Free State. It is not naturally a good port, and extensive harbour works have had to be built in order to cater for shipping. With the completion of these it is fast becoming a leading port of South Africa, mainly as the result of its position, *i.e.* its nearness to a productive hinterland. It is the third port of the Union, and has a large wool trade. Recently, manufacturing industries have been developed, and the General Motors and Ford motor works of South Africa are here. The population in 1936 was 99,000.

Sub-tropical Eastern Coast.—This region stretches from Port Elizabeth along the coast to the Natal border and inland as far as the great escarpment. It has a good rainfall throughout with a high temperature and an absence of frosts along the coast. The palm belt with tropical fruits occupies the coastal strip ; grassland with scattered trees and forests in the deeper valleys occurs inland. This is one of the great cattle regions of South Africa ; the principal grain is maize. There is a large Native population, and little room for European expansion, especially in the eastern part of the region, known as the Transkei and occupied largely by a Native reserve. The citrus orchards are situated mainly around the European centres of Port Elizabeth and East London. *East London* (47,000 inhabitants) is the largest town and port ; it does *not* depend for its importance on the region itself, but is the outlet for the interior as far as the Orange Free State. Like Port Elizabeth, it has developed manufacturing industries depending on the supply of raw material from the hinterland, and exports wool, hair and leather produced on the High Veld. It is a very popular seaside resort. *Grahamstown* and *King Williamstown* are the most important of the inland centres, the former as an educational centre.

Queenstown is farther inland, being situated just below the great scarp.

The Namib.—The greater part of the Namib lies in South-West Africa. In this coastal strip are found the most extreme desert conditions known in South Africa, the rainfall being less than 5 inches per year and very irregular.

The Karroo.—Both the Great Karroo and the Little Karroo are treeless plains hemmed in by mountains. Not only is the rainfall small (less than 15 inches), but it is very irregular. Usually drab and monotonous, the small shrubs and succulent plants burst into flower after a shower of rain and the country looks comparatively fertile. Indeed, where water is available, the soil is very fertile. The Government is quite aware of its immense possibilities and is already financing irrigation schemes. In particular, extensive irrigation works are being carried out in the Little Karroo, around Oudtshoorn. Oudtshoorn is the centre of the now dying ostrich-farming industry. Settlements on the Great Karroo are far apart, and the herds of goats form the principal source of wealth. *Beaufort West* is the chief town.

The Upper Karroo or Karroid Plateau.—This region lies north of the great escarpment. Nearly the whole is more than 3,000 feet above sea-level and slopes gently northwards towards the Orange river. It suffers from extremes of temperature, with severe frosts in winter and dry heat in summer. The rainfall is less than fifteen inches and is very irregular. The Upper Karroo consists of vast treeless plains broken by flat-topped hills. The soil is shallow and rocky. The vegetation consists of small scattered bushes and supports only a few sheep and goats. The whole region is very thinly populated and people depend on underground water which is raised by wind-driven pumps. There are no towns in the region of any size, but *Carnarvon* and *Victoria West* are the principal centres of the pastoral industry. The people of this district suffer greatly from drought, and there has been no appreciable rainfall here for periods of three years and more.

Bushmanland.—Around the Orange river the Upper Karroo passes into an area which has a still poorer and sparser type of vegetation. There are large patches of bare stony or sandy soil. Often the only plants are widely separated shrubs and, locally, tufts of grass.

The Kalahari Thorn Belt.—This region includes a great part of British Bechuanaland and will be considered later under Bechuanaland. In the area which lies in Cape Province the eastern border is of interest and importance owing to the occurrence there of the famous diamond mines of Kimberley and the ranching districts around Mafeking. *Kimberley* (39,000 inhabitants) has grown up entirely as the result of the diamond-bearing "pipes." The value of the diamonds produced at Kimberley exceeds that for the whole

of the remainder of the world, and diamonds rank third amongst South Africa's products after gold and wool (but see p. 402).

The High Veld.—Only a small part of the north-eastern border of Cape Province lies within the borders of the High Veld ; it is this region, however, lying north of the Stormberg (Fig. 317) which has the greatest density of sheep population to be found anywhere in the Union.

ORANGE FREE STATE

A small part of the Orange Free State along the western border has a rainfall of less than fifteen inches and forms part of the High Karroo. All the remainder lies on the High Veld ; the land slopes from the east gently westwards and the rainfall likewise decreases from east to west.

High Veld.—The High Veld is a vast, treeless, rolling plateau of grass. Where once large herds of antelopes roamed we now find vast herds of cattle, and in the drier parts flocks of sheep and goats. This is the chief pastoral region of the Union. The damper part forms a portion of the famous "maize triangle," whilst in the drier parts wheat is produced. All over the High Veld farms are dotted, each with its cattle sheds, apple orchards, and often with plantations of pines or gum trees. Another tree which has been extensively planted is the Australian wattle, the bark of which is used in tanning leather. Owing to the frequently precarious rainfall and the consequent periodic droughts, farming in this region is not always an enviable proposition. Great losses of stock and crops are recorded during the droughts. In addition to this danger there is the locust pest which has assumed alarming proportions. The locusts swoop down in dense clouds, so thick as to darken the neighbourhood, and in a few hours not a green leaf or blade of grass is to be seen over hundreds of acres. The pest occurs periodically, for the female lays hundreds of eggs which may not be hatched for two or three years. Great efforts are being made to exterminate the locust entirely. Near the western border of the Orange Free State is the diamond centre of Jagersfontein, a few miles from Kimberley in the Cape. Near the northern border of the Free State along the Vaal river there are coalfields, but as yet they are little developed, and unfortunately the quality of the coal is not good enough for export. Coal probably underlies the whole of the northern part of the State (see Fig. 321).

Bloemfontein (51,000 inhabitants) is the administrative centre of the Free State, and is the natural collecting and distributing centre for the agricultural produce. It lies in the drier part of the State in the wheat and sheep area and just outside the main maize and cattle region. It is also a railway centre and the legal centre of the Union. *Kroonstad* and *Bethlehem* are two of the principal centres in the maize belt. Great progress has been made in recent years in the

maize industry by the construction of maize elevators throughout the Free State, and the greater part of the maize crop is now handled in bulk and not by the old system of bags.

TRANSVAAL

The development of the Transvaal has depended on its mineral industries, especially gold and coal, rather than on agriculture, though the latter is also of great importance. There have been extensive changes in the scenery of the country by reason of the development of industries in the gold-fields of the Witwatersrand.

High Veld.—The High Veld in the Transvaal is very similar to that in the Orange Free State, except in the Witwatersrand industrial region. It forms part of the great maize and cattle area, and extends roughly as far north as Pretoria. There are scattered farms as in the Orange Free State, each with its clump of foreign trees (gum, wattle, or pine) and orchard of deciduous fruit trees.

The Witwatersrand industrial region extends for 70 miles east and west through Johannesburg along the line of the famous banket reef. It is the greatest gold-field in the world, and produces roughly half the world's annual supply of gold. The development of the gold-field has been made possible by the supplies of cheap coal from Witbank and the abundance of cheap native labour. The coal is used for generating electricity, and the supply of cheap electricity has also made possible the development of other industries. There are now seven industrial towns with more than 50,000 inhabitants—Johannesburg, Springs, Germiston, Benoni, Krugersdorp, Brakpan, and Boksburg, and the whole area forms the nearest approach in Africa to a "conurbation," or group of industrial towns, with a total population of about a million. *Johannesburg* is the largest town in the Union and the leading industrial centre. In 1936, there were 475,000 inhabitants of which 252,000 were Europeans and 191,000 natives. The town was founded in 1886 and progressed with remarkable rapidity. The gold-bearing banket is crushed by rollers and stamps and the gold extracted; all round Johannesburg there are huge dumps of waste white sand. One group of mines alone deals with a quarter of a million tons of ore per year. Some of the mines are now as deep as 7,000 feet. The bare veld around Johannesburg has been beautified by plantations of trees, especially gums planted for supplying pit props and mining timber as well as for ornamental purposes. The water supply is derived mainly from the Vaal river. Johannesburg has a focal position, with easy access from the leading ports of Lourenzo Marques, Durban, Port Elizabeth, and Cape Town, and good rail facilities for the distribution of manufactured products throughout South Africa. *Germiston* (68,000 people) is nine miles from Johannesburg, almost in the centre of the gold region. It has the largest gold refinery in the

world, and is an important railway junction. Other industries have been developed, including chemicals (carbide), engineering works, cement pipes, agricultural products (cornflour, starch, and cattle foods). *Boksburg* (50,000), *Benoni* (84,000), and *Springs* (87,000) all lie to the east of Johannesburg in the East Rand: they are all gold-producing centres. *Krugersdorp* (55,000) (near where the gold-bearing banket was first worked) lies to the west of Johannesburg in the West Rand. *Witbank* and *Middelburg* are coal-field centres. The coal is sent mainly to the Rand and Pretoria, but a little is now exported. Notice the position of these coal-fields on the railway between Pretoria and Johannesburg and Lourenzo Marques. *Potchefstroom*, to the south-west of Johannesburg, is the old capital of the Transvaal. *Vereeniging*, to the south of Johannesburg on the Vaal river, has iron and steel works, but only scrap iron is used.

The Bush Veld.—This region, which occupies the greater part of the Northern Transvaal, is rapidly increasing in importance, though there are still large areas undeveloped. The whole region is often divided into a number of smaller regions:

(a) Banken or slopes. About Pretoria the country consists of lines of hills running from east to west, the most important being the Magaliesberg. The strata dip northwards, the gentle slopes are grass covered, but the rocky parts have thorny bushes. In this area there are valuable iron ores which are now being developed, lime and cement works. The Premier Diamond Mine lies some distance eastwards from Pretoria.

(b) The bush veld lies farther to the north, and consists of grass land with numerous thorny bushes. In this region is the famous Haartebeestpoort Dam on the Crocodile river. This is the largest of the irrigation works in South Africa.

(c) The Waterberg sand veld and Pietersburg Plateau lie to the north of the Transvaal bush veld.

(d) The Limpopo bush veld or low veld occupies the broad valley of the Limpopo river.

The region as a whole slopes gradually from the neighbourhood of Pretoria northwards to the Limpopo River, there is therefore an increase of temperature as lower ground is reached, and near the Limpopo the climate becomes tropical, and malaria is prevalent. When compared with the High Veld the agricultural activities of the region give evidence of its warmer character. It is a fine cattle-ranching region, but there are few sheep; citrus orchards flourish, but not deciduous fruits; cotton, tobacco, pea-nuts (monkey-nuts or ground-nuts) and other tropical or semi-tropical crops are grown. In the extreme north, near the Limpopo, lies Messina, where deposits of copper are being worked. The Beit Bridge has recently been constructed across the Limpopo at this point with the object of connecting the Transvaal and Southern Rhodesia by rail and road.

Pretoria.—Pretoria, with 108,000 inhabitants, is the administrative capital of the Union; it is a fine city, and is situated in a pleasant open valley. Notice its position between two large natural regions. It is 45 miles by rail or good road from Johannesburg, and a short distance from the coal-fields. The proximity of the coal to large resources of iron ore has recently resulted in the inauguration of the first modern iron-smelting works in all Africa. At a cost of some £6,000,000, the South African Iron and Steel Industrial Corporation has erected coke-ovens, smelting plant, steel works, rolling mills and sheet works at Pretoria, capable of producing 170,000 tons of steel a year. Smelting actually began early in 1934. Pretoria already possessed extensive railway workshops; the new iron and steel industry will doubtless attract other manufacturing establishments. North-east of the city lies the Premier Diamond Mine, where the Cullinan Diamond, the largest in the world, was found.

Eastern Low Veld.—This region lies below the great scarp. Frosts are rare, and the region is semi-tropical. It is largely undeveloped, but is similar to the Limpopo bush veld.

NATAL

The whole of Natal lies below the great scarp, which is here called the Drakensberg, but the land rises from the sea by a series of steps due to the horizontal strata (see Fig. 338). The region is wet, the rivers are nearly always full of water, and pass over the steps in a series of waterfalls.

Coastal Strip or Palm Belt.—Along this sub-tropical strip frosts do not occur. There is an excellent soil, and as a result the land supports a big Native and Indian population. The palm belt extends up to a height of 1,000 feet and includes the greater part of Zululand in the north. Maize is the principal grain, but sugar cane is the chief crop grown in European plantations. Tropical fruits, especially pines, are extensively grown, and there are plantations of the Australian black wattle. Cattle are numerous, and dairy-farming is important. A beginning has been made with the cultivation of cotton in Zululand, but the quality needs improving. Durban lies in this belt.

Grass Veld and Thorn Veld.—This belt stretches inland from the Palm Belt to the foot of the scarp. It is often called the sweet veld. It is drier than the Coastal Belt, and Kaffir corn is the principal grain. In this region lies the coal-field of Newcastle, and large quantities of coal are mined for export through the port of Durban.

Mountain Grass Veld (Sour Veld).—The mountain slopes are covered with grass and with forests in the sheltered parts. There is much very fine scenery in the Drakensberg, and the highest point

in South Africa is the Giant's Castle (11,000 feet). The horizontality of the strata is responsible for the characteristic bold scarp landscape (Fig. 338). Great difficulty was experienced in constructing a railway through the mountains into the Transvaal: the railway has recently been electrified.

Durban (Port Natal).—The harbour of Durban is a natural bay with a narrow entrance which was formerly obstructed by a sand bar. The sand bar has been partly removed by constant dredging. The Port is well equipped with grain elevators and has the largest floating dock in South Africa. Durban is the principal coal-exporting centre of the Union. It is the third town of the Union, with 240,000 inhabitants, of which nearly one-third are Natives, one-third Indians, and rather over one-third Europeans. The numerous fine bathing beaches to the north and south of Durban attract large crowds of holiday visitors. A small whaling industry is centred at Durban. Tea is grown to some extent in Natal and prepared at Durban, but the bulk of the tea used in South Africa is imported. The fruit-growing in Natal has given rise to a trade in the distribution and export of fresh fruit, as well as to jam manufacture. More important is the manufacture of sugar and its by-products — syrup and molasses. The cane is grown chiefly in Zululand, but the manufacture of sugar is centred in Durban. Recently the preparation of natalite, a type of motor spirit, from sugar has been tried with considerable success. *Pietermaritzburg* (47,000) is the administrative centre of Natal; its foundation dates from 1839. *Newcastle* is the principal colliery town. There are possibilities in the development of various industries; it has already an iron and steel industry and a large creamery.

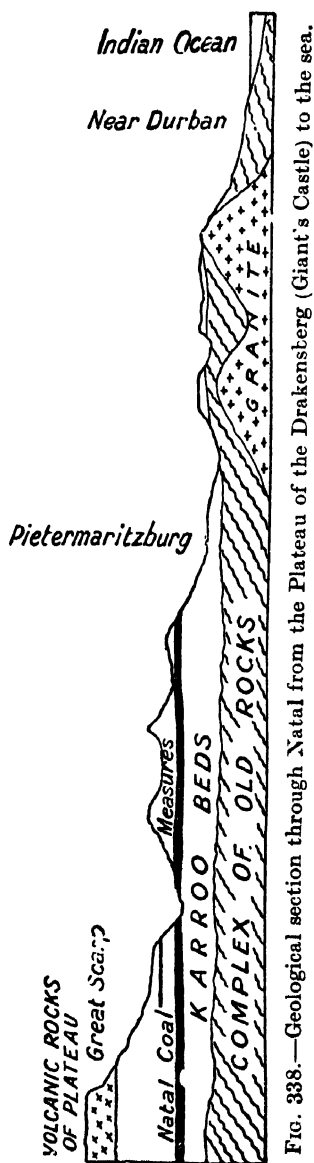


FIG. 338.—Geological section through Natal from the Plateau of the Drakensberg (Giant's Castle) to the sea.

BASUTOLAND

Basutoland is really a Native Reserve. It is situated on the High Veld, that is, to the west of the escarpment, but the scenery is rather different from that of the Orange Free State. The country is more mountainous, and the rivers, which are usually perennial, have cut deeper valleys. Many of the hills are capped by black lava flows of basalt. The rainfall is inclined to be erratic, but averages 30 inches; its torrential character in summer results in much soil-erosion. Maize, sorghum and wheat are the chief food crops, of which in normal years there is a small export surplus. Sheep, goats and cattle constitute the livestock wealth; wool and mohair are exported. There are 600,000 Natives, many of whom work in the mines of the Transvaal, 2,000 Europeans, whilst the administration is carried out by a resident Commissioner, aided by a Council of Natives nominated by the Chiefs. Education is in the hands of missionaries.

SWAZILAND

The Swazis are akin to the Zulus who live just to the south-east. Swaziland lies below the scarp and is therefore divided into high, middle and low veld—the middle and low veld are separated by the Ubomba Mountains. Maize is the chief crop, and there are nearly half a million cattle. Cattle are regarded as wealth by the natives, and the stock is in consequence of poor quality; there is much overgrazing, resulting in soil-erosion and diminution of water supply.

BECHUANALAND PROTECTORATE

This huge area of more than a quarter of a million square miles includes nearly the whole of the so-called Kalahari Desert. Really the whole is a grassland with scattered trees, mainly acacia. It has a fine winter climate but very hot summers; fever is prevalent, because mosquitoes breed near any water. The great trouble is the scarcity of surface water. The country is flat, except near the Transvaal border where there is fine hilly scenery. Although there are no rivers, there are well-defined watercourses, and a large lake, Lake Ngami, which is, however, very shallow and often nearly dry. Population is 260,000 including nearly 2,000 Europeans, mainly along the Rhodesian railway line. Ranching is the principal occupation; there are half a million cattle and the same number of sheep and goats. Live animals and hides and skins are exported. Maize and sorghum are the chief crops.

SOUTH-WEST AFRICA

In 1814 the Cape Government sent a German missionary into South-West Africa. He settled in the country and was followed later by other German missionaries and traders. In 1876 the natives asked the British for someone to rule over them, but only Walvis Bay was annexed. The Germans purchased the rest of the coast between 1882 and 1885, the whole country was annexed by Germany in 1890. In the Great War, Windhoek, the capital, was occupied by Union forces in 1915, and later the whole German force surrendered. South-West Africa is now administered by the Union under a mandate from the League of Nations.

The whole country is a third of a million square miles. There are no perennial rivers except the Orange, which forms the southern boundary, and the Kunene, which forms the northern boundary. The population is about 360,000 including 32,000 Europeans; the numbers of the Bushmen in the north and east are not accurately known. Minerals, especially diamonds, make up the bulk of the export trade, but the large animal population, numbering 3 million sheep and goats (mainly in the south) and 700,000 cattle (mainly in the north), plays a greater part in the life of the people.

The Namib.—The scarp of the plateau is not nearly so well defined in South-West Africa as it is in the east. The part below the scarp known as the Namib is very dry, and of desert-like character. Often there is no vegetation at all. The coast has two ports, Walvis Bay, with a small but good natural harbour, and Luderitz, which became of importance as the result of a discovery of alluvial diamonds near the coast.

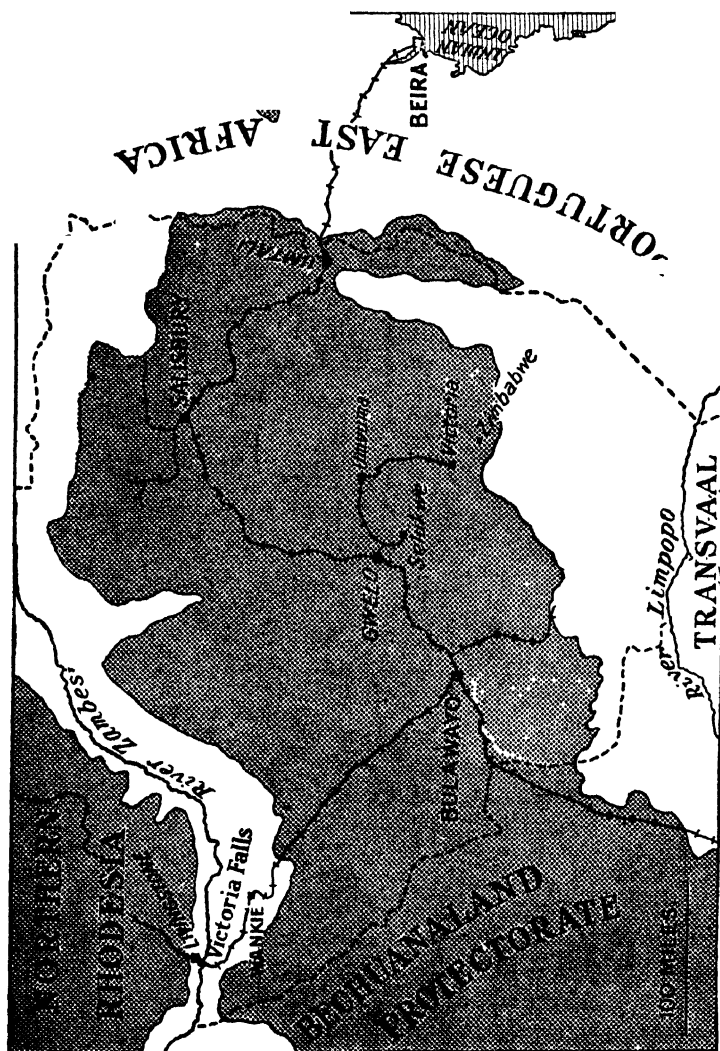
Great Namaqualand.—The country above the scarp is rocky or sandy and covered with scrub vegetation. It is essentially a cattle country, and depends on subterranean water supply. The capital of South-West Africa is Windhoek, situated in this region. Copper, vanadium and tin have been worked in the north of the country.

The Kalahari.—The Kalahari occupies the whole of the north and east of the country. In places there are salt pans of which Etosha Pan is the largest. Few crops are possible, maize is the chief. The main railway lines in the territory run from Walvis Bay and Luderitz to join the Union main line at De Aar.

SOUTHERN RHODESIA

Size, Position, and History.—Southern Rhodesia has an area of rather over 152,000 square miles, or larger than the Transvaal and Natal together. It lies wholly within the Tropics and stretches from the Limpopo River in the south to the Zambesi River in the

north. Southern Rhodesia has no sea coast, being separated from the Indian Ocean by the Portuguese territory of East Africa. Consequently all the foreign trade with countries outside Africa must pass through other countries before the coast is reached; actually most of the trade passes through the Union of South



Africa to Cape Town, or through the Portuguese port of Beira. Rhodesia takes its name from C. J. Rhodes, who was mainly responsible for the addition of the whole territory to the British Empire. In 1888, Lobenguela, King of the Matabele nation, entered into a treaty of peace with Great Britain and granted mineral

concessions (the Rudd Concession) to a group of men who next year founded the British South Africa Company. The Company was given its Royal Charter by the British Government in 1889. The Company organized a pioneer expedition which founded Salisbury in 1890. Both Northern and Southern Rhodesia were administered by the Company until 1923, when the people of Southern Rhodesia (comprising the two provinces of Matabeleland and Mashonaland) elected to govern themselves. In 1924 Northern Rhodesia became a Crown Colony under the British Government.

Physical Features.—The whole of Southern Rhodesia lies on the great African Plateau. Running across the country from south-west to north-east is a broad belt of land more than 4,000 feet

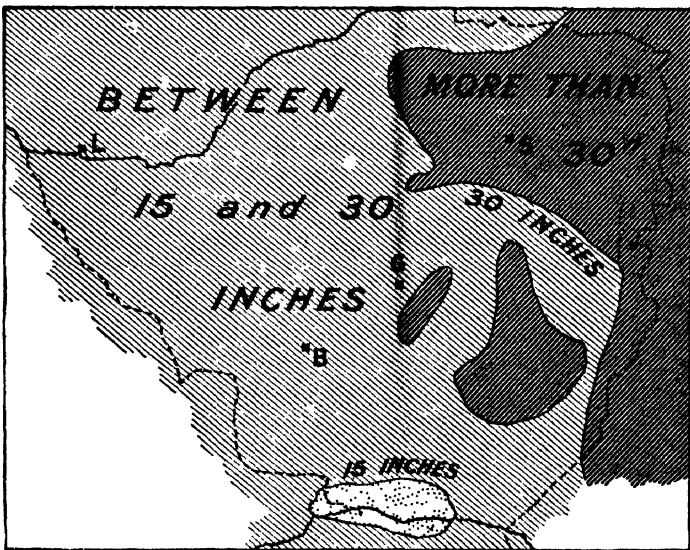


FIG. 340.—Rainfall map of Southern Rhodesia.

above sea-level. On either side of this central plateau the land slopes away gently, on the north-west towards the Zambesi River, on the south-east towards the Limpopo. Both along the north-western and the south-eastern borders there are thus broad strips of land less than 3,000 feet above sea-level and even as low as 1,000 feet. Broadly speaking, the northern half of the territory lies in the Zambesi basin, the southern half in that of the Limpopo. In the north-west of the colony lie the famous Victoria Falls, where the great Zambesi River plunges over a ledge a mile wide into a chasm 360 feet deep. Just as in the Union of South Africa, the plateau is highest in the east, along the borderland between Rhodesia and Portuguese East Africa. Generally the surface of the plateau is gently rolling, occasionally interrupted by low ranges of granite

hills, such as the Matopos near Bulawayo. In the eastern districts, however, round Umtali and Melsetter, the country is mountainous, for the edge of the plateau has been cut up by deep valleys.

Climate.—Southern Rhodesia may be divided into two climatic divisions :

(1) Land below 3,000 feet. The climate is tropical, frosts are rare or absent, malaria is of common occurrence, and Europeans usually feel the strain consequent upon living in a tropical climate.

(2) Land above 3,000 feet. The climate is sub-tropical, light frosts are common in the cold season, the region is healthy and very suitable for European occupation.

As in the Transvaal, there are two seasons in Rhodesia, the "Wet Season" from October to the end of March and the "Dry Season" from April to the end of September. The rain-bearing winds, as in the Transvaal, come from the east, that is from the Indian Ocean, so that the rainfall is heaviest on the east and decreases gradually westwards. Over most of the country it is between 15 and 35 inches. After the rains many of the tributaries of the Zambesi and Limpopo form river courses 100 yards and more in width, but in the dry season many of them are completely dry.

Geology and Minerals.—Two-thirds of Rhodesia is built up of a complex of granite and old hard rocks. In the broad Zambesi and Limpopo valleys these rocks are covered by coal-bearing Karroo sandstones and shales. Scattered through the old rocks are numerous gold-fields, and gold is Rhodesia's leading export. Rhodesia leads in the world's production of chrome, nearly all of which comes from a single area near Selukwe. Also, Rhodesia is second in the list of countries producing asbestos, and has large reserves of this mineral. Copper has declined in importance since the rapid expansion of mining in the Katanga region of Northern Rhodesia and Belgian Congo. Although several coal-fields are known, nearly all the coal at present is obtained from Wankie, on the railway between Bulawayo and Victoria Falls. Large quantities are sent to the mining districts of the Katanga.

Natural Vegetation.—Except in the eastern mountains where there are wet evergreen forests and mountain forests, nearly the whole of Rhodesia is covered with savana and savana forests. It is mainly in the west and in the valley of the Zambesi that the trees are sufficiently large to be cut for timber. Two of the most important timbers are Rhodesian teak and Rhodesian mahogany.

Agriculture—Animals.—Southern Rhodesia is a cattle country rather than a sheep country. There are huge ranches where beef cattle are reared, but dairy-farming is of increasing importance along the railway from Bulawayo to Gwelo and Salisbury, each of

which has a creamery. Strenuous precautions are taken to prevent disease, particularly rinderpest. The north-western region is subject to tsetse fly. Pigs and poultry also do well in the country.

Agriculture—Crops.—Maize is the staple crop and occupies four-fifths of the cultivated land. Tobacco does well on the light sandy soils overlying the granite. There are still tremendous opportunities for crop-farming in Rhodesia. Among other crops suitable to the climate are cotton, ground-nuts, sunflowers (the seeds of which yield oil), beans and fibre plants, as well as vegetables for local use. Citrus fruits grow well and oranges are being exported to Europe.

Population.—Southern Rhodesia is capable of supporting a very much larger population than exists at present and the country is developing rapidly. Of the 1,228,000 natives, nearly half are employed by, or dependent upon those employed by, the 55,000 Europeans. The leading occupations are stock-rearing, agriculture, and mining. There are only four towns with more than a thousand inhabitants—Salisbury, Bulawayo, Gwelo, and Umtali.

Salisbury is the capital, and is fast becoming an important industrial centre for the preparation of bacon, flour, biscuits, oil, candles, tobacco, leather, and other products depending on the local supplies of raw material.

Bulawayo is the gateway to Rhodesia from the south: the railway from Bulawayo to Cape Town is operated by the Union railways, and the journey is performed in under three days without change of train. Bulawayo is the junction for the line to Wankie, Victoria Falls, Northern Rhodesia, and the Belgian Congo. It is also the headquarters of the Rhodesian railways.

Gwelo lies roughly halfway between the towns of Bulawayo and Salisbury and is the collecting centre of the rich farming districts of the Central region as well as of the gold-mining area. Actually Southern Rhodesia is divided into two provinces, Mashonaland in the north and Matabeleland in the south and west, but the people in the country often refer to the central parts around Gwelo as the Midland Province.

Umtali lies on the extreme east, very close to the Portuguese territory, and amongst the most mountainous parts of Rhodesia. It lies on the railway from Salisbury to the port of Beira, and so deserves the title of the "eastern gateway of Rhodesia."

Southern Rhodesia is unfortunate in that it has no coast line. The nearest port is Beira in Portuguese East Africa, but much of the foreign trade passes through the Union of South Africa to Cape Town.

Among other attractions which bring large numbers of visitors to Southern Rhodesia every year are the famous Victoria Falls on the Zambesi River, the various ruins, remnants of a former civiliza-

tion, such as those at Zimbabwe, near Fort Victoria. Rhodes, the pioneer of Rhodesia; and his able helper, Sir Starr Jameson, lie buried in the lonely Matopo Hills, about twenty miles from Bulawayo.

Railways.—The Beira, Mashonaland, and Rhodesian railways are built on the same gauge as the South African railways in the Union. The main line is from Beira to Salisbury, Salisbury to Bulawayo, and from Bulawayo across the wonderful bridge at the Victoria Falls to Northern Rhodesia and the Congo. Before the country can be adequately developed, many more railways are needed.

NORTHERN RHODESIA

The vast territory of Northern Rhodesia, which is larger than the whole of the Cape Province, was first brought to the notice of Europeans through the explorations of the famous Scottish medical missionary, Dr. David Livingstone. Livingstone discovered the Victoria Falls in 1855. The most important tribe of Northern Rhodesia is the Barotse, and Lewanika, then the great chief of the tribe, sought the protection of the British over seventy years ago. In 1899 he gave the British South Africa Company mineral and trading concessions over the whole of his dominions. Northern Rhodesia has been administered as a Crown Colony of the British Empire since 1924.

Physical Features.—Northern Rhodesia lies almost entirely on the high African plateau and stretches from the Zambesi to the southern end of Lake Tanganyika.

Climate.—The country is entirely within the Tropics, but most of the surface is more than 3,000 feet above sea-level and so comparatively cool. Even in the south the temperature rarely drops to freezing point and rarely rises above 100°; at Livingstone the average for the year is 73°. The whole country lies in the summer rainfall region and everywhere enjoys a sufficient rainfall.

Geology.—Much of the surface is covered by old hard rocks, rich in minerals. Important deposits of silver, lead, and vanadium ores are found at Broken Hill, but by far the most important minerals are the copper ores of the Katanga, a zone extending into the Belgian Congo. Only discovered in 1927–8, they have risen rapidly to a position of world importance, and several great mines and smelting plants now produce copper for export mainly to Britain and Europe. The centre of the mining district is Ndola.

Natural Vegetation.—The predominant natural vegetation is the African savana, grassland with scattered trees. In many parts the trees become much more numerous, and the result is a forest with an undergrowth of grass. Timber, mostly of hard woods, such as Rhodesian teak and Rhodesian mahogany, is worked in the country north of the Zambesi to the west of Livingstone.

Agriculture.—Northern Rhodesia is as yet little developed, but is a cattle-ranching and farming country with great prospects. Maize is the chief crop at present, but Kaffir corns (sorghums), wheat, and oil seeds are also grown. Cotton-growing is likely to become important; citrus fruits, tobacco, and fibre-yielding plants all do well. The northern parts are still infested with the tsetse fly, but in the south cattle are reared. The mining communities purchase much of the agricultural produce.

Livingstone is the principal town and was, until recently, the capital. It is only a few miles from the Victoria Falls, the borders of Southern Rhodesia. Various agricultural settlements are scattered along the railway, which runs through the country from Victoria Falls to the Belgian Congo. Fort Jameson, near the Nyasaland frontier, and Abercorn, near Lake Tanganyika, are other farming centres far from the railway. The new capital is Lusaka. The total number of Europeans in the country is about 10,000.

United Kingdom						Japan	Tanganyika	U S A	Ind	Gc	Others	
I	COTTON	OILS	COFFEE	MACHINERY	VEHICLES	TOBACCO	TEXTILES	MISCELLANEOUS				
E	C O T T O N					COFFEE	SISAL	SUGAR	OIL SEEDS	HIDES	SODA	OTHERS
I n d i a						United Kingdom	Japan	TT	U S A	Others		

FIG. 341.—Trade of Kenya and Uganda. (Average 1933–35.)

Average value of Imports, £5·6 millions (*cf.* 1926–29, £8 2).

Average value of Exports, £5·9 millions (*cf.* 1926–29, £6 6).

EAST AFRICA

Physiographically East Africa consists of two parts:

- A portion of the great plateau of Africa.
- The coastal lands between the plateau and the sea.

East Africa is divided between the British Colonies or Protectorates of Uganda, Kenya, Tanganyika and Nyasaland, and the Portuguese Colony of Portuguese East Africa. Uganda, Nyasaland, and most of Tanganyika lie on the plateau; Kenya is half on the plateau and half on the coastlands; Portuguese East Africa is mostly on the lowlands of the coast.

The Coastal Lands.—These lands lie entirely in the Tropics and are therefore hot. They may be divided into two parts:

- The coastal plain, hot, wet, and often unhealthy. Coconuts grow along the coast and copra is exported. This region is

also suitable for rubber and sugar cane. From the European point of view the coastal plain is a planter's country in distinction from the settler's country of the highlands. The island of Zanzibar is famous for cloves. Rice is the principal food grain. Along the coast are several ports which serve as the gateways into the interior, such as Mombasa in Kenya, Dar-es-Salaam in Tanganyika, and Beira in Portuguese East Africa. The extreme south of Portuguese East Africa lies outside the Tropics, and the port of Lourenço Marques is the main outlet of the Transvaal.

(b) A hilly region (between the coastal plain and the plateau), which is drier, has a poor soil and is of little use.

The Plateau.—Owing to its great height above sea-level—usually from 3,000 to 4,000 feet—the plateau has a cool and pleasant climate suitable for Europeans. Many parts have a rich volcanic soil and a moderate rainfall. The chief food crop is maize, but the principal crop grown for export is cotton. Large quantities are exported from Uganda, Kenya, and Tanganyika. Coffee and sisal

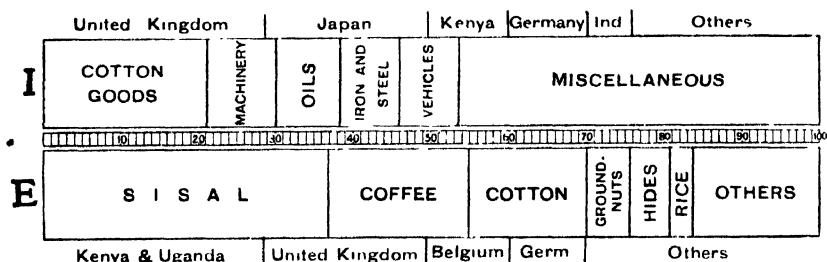


FIG. 342.—Trade of Tanganyika Territory. (Average 1933–55.)

Average value of Imports, £2.4 millions (cf. 1925–29, £3.6).

Average value of Exports, £2.6 millions (cf. 1925–29, £3.5).

hemp are also important. Parts of the plateau are also very suitable for cattle.

Uganda, Kenya, and Tanganyika are developing rapidly and likely to become important countries in the near future, especially as producers of cotton. Portuguese East Africa is slow in developing. Except the ports, there are few towns of any size yet. The important one is Nairobi, in Kenya. Zanzibar, on the island of Zanzibar, is a great trading centre, as well as an old port. On the plateau the lakes form the chief highways of communication, and the railways linking the interior with the coast should be carefully noted.

THE BELGIAN CONGO

The Belgian Congo occupies the greater part of the basin of the great Congo River. The basin forms a saucer-shaped depression in the surface of the plateau of Africa. The floor of the "saucer" is

about 1,000 feet above sea-level. The Congo and many of its tributaries rise in the south on the high plateau of South Africa. The main river drops into its basin by a series of rapids or falls, and flows northwards as a navigable waterway as far as the Stanley Falls. From the Stanley Falls the river swings westwards and is navigable as far as Stanley Pool. Then the river drops rapidly by a series of rapids to the coast. Compare this with the River Nile. The equator passes through the Congo Basin, and so the basin has a



FIG. 343.—Section across Africa roughly along the Equator, showing the Congo Basin and the High Plateau of East Africa.

high temperature with heavy equatorial rains. All the lowlands are covered with dense evergreen forests. The highlands surrounding the basin, and sometimes the ridges between the rivers, are covered with savana or grassland.

The Forest is thinly peopled, largely owing to difficulties in clearing. It is in these dense forests that the pygmies live. Elephants are still numerous, and ivory is an important product. Wild rubber was formerly of considerable importance, but ruthless

		Belgium		UK	USA.	Japan	Ger.	Fr.	Others
I	FOODS	COTTON GOODS	MACHINERY	OIL	DRINK	MISCELLANEOUS			
E	GOLD	COPPER	PALM OIL AND NUTS		COTTON	DIAMONDS	TIN ORE	COFFEE	OTHERS
		Belgium					Ger.	Fr.	Others

FIG. 344.—Trade of Belgian Congo. (Average 1933-35.)

Average value of Imports, 431 million francs (c. £3.6 millions). (Cf. 1925-29, 1.4 million fr.)
Average value of Exports, 901 million francs (c. £7.5 millions). (Cf. 1925-29, 1.0 million fr.)

exploitation has diminished the supply. The oil palm yields palm oil and palm kernels, used in soap-making. Copal is a sticky substance, rather like resin, obtained from certain trees.

Katanga, a portion of the plateau on the south, has become very important recently because of its rich mineral deposits. Copper is the chief metal, and Elisabethville the chief mining centre. Coal and food for the miners are obtained partly from Rhodesia. Notice that Katanga lies right in the heart of Africa, and that the copper-mining region extends into Northern Rhodesia. There are at present four main ways in or out. The chief is by railway through Rhodesia

to Beira, a second is by rail and river to the Congo mouth, and a third is across Lake Tanganyika and the British colony of Tanganyika to Dar-es-Salaam. The most recent, and most direct, route is by railway to Benguella, in Angola.

Communications.—The earlier railways were built to circumvent rapids on the rivers. One is from the port of Matadi to Leopoldville; another is round the Stanley Falls. The short railway joining the Congo and Lake Tanganyika should also be noted. Parts of the Lualaba, the Congo, and the Kasai rivers are navigable.

ANGOLA

Angola is larger than the four provinces of the Union of South Africa, but has a much smaller population. It has been a Portuguese possession since 1575, but very little development has taken place. Yet there are huge areas of good grassland on the plateau, and cattle-rearing is likely to become important. Maize, coffee, and cotton are grown, and diamonds and copper are known to exist. The railway recently constructed—from Lobito Bay and Benguella to the Katanga mining district of the Belgian Congo—is largely due to British enterprise. It affords an important new “side-door” into Africa.

WEST AFRICA OR THE GUINEA COAST

From Cape Verde in latitude 15° N. to the mouth of the River Congo in latitude 6° S. is roughly 3,000 miles. Along this coast there are four British colonies, seven strips of French territory, a Portuguese colony, a Spanish colony, and a Negro republic. All these small countries have certain things in common. They may all be divided into two parts:

(1) *A Coastal Plain* with heavy rainfall. The rain falls mainly in the summer months, but the climate is hot and damp all the year. The natural vegetation is hot, wet evergreen forest of equatorial type in the wetter parts, deciduous forest in the drier. Mahogany, ebony, and other hard timbers are obtained from the forests, but more important is the oil palm from which palm oil and palm kernels are obtained and exported. Wild rubber is collected, and rubber plantations have been started in many places. In some parts (Gold Coast, Nigeria, and the island of Sao Thomé) much cocoa is produced. Rice is a favourite food of the natives, together with manioc and maize. Kola nuts are chewed by the natives as a narcotic.

(2) *The Plateau Regions*, with a smaller rainfall and poorer soil. The temperature, owing to the height above sea-level,

is lower and the natural vegetation is savana. The crops grown are mainly for the use of the natives—millet, maize, and rice for food and cotton for clothing.

The old rocks of the plateau are sometimes rich in minerals; much tin is obtained from Nigeria, gold and manganese from the Gold Coast, iron-ore from Sierra Leone, and coal from Nigeria.

Gambia is a small British colony. *Sierra Leone* is another British colony. Its capital, Freetown, has a good harbour and is a coaling station. *The Gold Coast* and *Ashanti* are also part of the British Empire. There are railways from the ports of Takoradi and Accra to Kumassi.

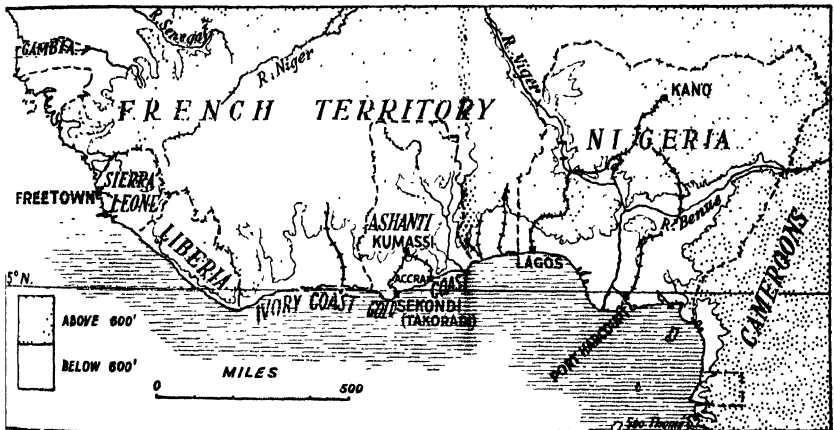


FIG. 345.—West Africa.

Nigeria is the largest British colony. Its chief port is Lagos. Notice the course of the River Niger which, like other African rivers, is navigable in its upper course but is interrupted by rapids where it descends from the plateau. Railways connect the ports of Lagos and Port Harcourt with the tin-bearing regions of the plateau and the old market town of Kano.

Liberia is a republic which was founded for negro slaves liberated from America. It is in a very backward state.

THE MEDITERRANEAN OR BARBARY STATES

That part of North Africa which enjoys a Mediterranean Climate is divided between three states, Morocco, Algeria, and Tunis. Running through the three countries are the mountain chains of the Atlas, as shown in Fig. 346. Three broad natural regions may be distinguished :—

(a) The coastal strips.

- (b) The plateau between the main chains of the Atlas.
- (c) The Saharan plateau.

The rain-bearing winds of the cold season come from the west, and so Morocco, on the west, enjoys the best rainfall.

Morocco is an old Mahomedan Empire, now under the protection of France. In the north, Ceuta and the surrounding tract are under Spanish rule, but the main port of Tangier is international.

The Coastal Plains are fertile; barley, wheat, and maize are widely grown. Huge numbers of Mediterranean fruit trees also exist—olives, vines, figs, oranges, etc. Numerous cattle are reared. Nearly one-half of the people of Morocco live in this fertile plain. Casablanca is the chief town and port, and Fez is an important trading centre. Behind the coastal plain, but before one reaches the Atlas mountains, is a low plateau called the Meseta. Except

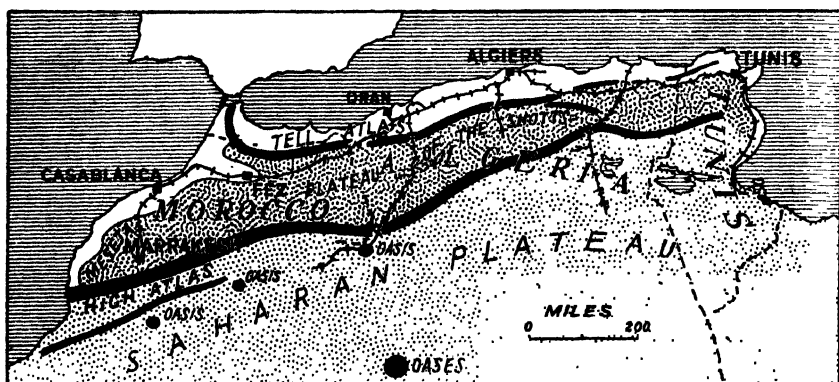


FIG. 346.—Mediterranean Africa (the Barbary States).

near the hills, where there is water for irrigation, it is too dry for crops. But there are large numbers of sheep and cattle. On the Meseta is Marrakesh (or Morocco), an important market.

The Atlas Mountains and Enclosed Plateaus.—The mountains are often covered with forests of cork-oak, cedar, etc. The plateaus are capable of but limited development.

The Sahara has a number of oases with date-palms.

Morocco is a backward country, but is likely to advance under French influence; and it is rich in certain minerals, especially phosphates, which are used in the manufacture of artificial manures.

Algeria is a French Colony and has developed rapidly under French influence.

The Coastal Strip, lying between the crest of the mountains and the sea, is known as the Tell, and is the most important part of the country. The valleys and plains have good soil, but usually require

to be irrigated. Large quantities of wheat and barley are grown, as well as the vine and various fruits. The progressive farms are mainly owned by French colonists. The hills are covered with forest or scrub forest, the most important trees being cork-oak, pine, and cedar. The higher parts of the hills are suitable for sheep-rearing and, after wine, sheep form the chief export of Algeria. Along the coast sardine fisheries are important. The principal towns and ports are Algiers and Oran.

The Plateau between the Tell and the Saharan Atlas is known as the Plateau of the Shotts, a shott being a shallow lake which dries up in the hot season. The plateau is covered with poor grass on which feed many sheep and goats. The inhabitants are nomads, and move about with their flocks in search of good grass. The alfa or esparto grass is used for paper-making.

The Sahara has several oases, and the French have sunk artesian wells and made it possible to extend the fertile area. The great product is the date. Iron ore and phosphate are mined in Algeria, and other minerals in smaller quantity. The French have built a number of railways in Algeria and developed the country, so that its export trade (wine, sheep, wheat, tobacco) is four or five times as great as that of Morocco. The trade is mainly with France.

Tunis is also a French Protectorate. It forms a continuation eastwards of Algeria and may be divided into the same regions, but the Plateau of the Shotts is much narrower. Olive oil is the chief agricultural product, and phosphates are mined. The principal town is Tunis, near which are the ruins of Carthage.

THE BASIN OF THE NILE

The Nile is one of the world's greatest rivers. The main river, which flows through Egypt, is formed by the union of two main branches, the White Nile and the Blue Nile. The White Nile rises in the Lake Victoria on the high plateau of East Africa. Lake Victoria is right on the equator, and so receives a good rainfall nearly all the year round. Flowing northwards the Nile drops by a series of rapids and waterfalls till it reaches the flat plain known as the Bahr-el-Ghazal. For nearly a thousand miles through this plain, from Rejaf to Khartoum, the White Nile is navigable. The plain is so flat that large areas are covered with marsh and the Nile is joined by many streams, of which the largest is the Bahr-el-Ghazal. This plain lies in the Tropical Climate or Savana Region, with rain in the summer. The Blue Nile rises in a small lake in the midst of the Abyssinian Mountains. In summer the snows on the high mountains melt and monsoon rain falls, so that the Blue Nile comes down in flood at the end of the summer, in August or September. The White Nile is then a constant stream; the Blue Nile has a flood season and

Alexandria is the principal port, controlling nearly nine-tenths of the trade. Raw cotton forms over two-thirds of the exports of Egypt; cotton seeds are also exported. Egypt cannot grow enough food for her big population, and imports foodstuffs as well as coal, wood, cotton goods, and iron and steel manufactures. Notice from the map the communications of Egypt, especially the way in which the railways have been built where the river cannot be used.

The **Suez Canal** lies in Egyptian territory. It cuts through a flat strip of desert, the isthmus between Egypt and Sinai. The

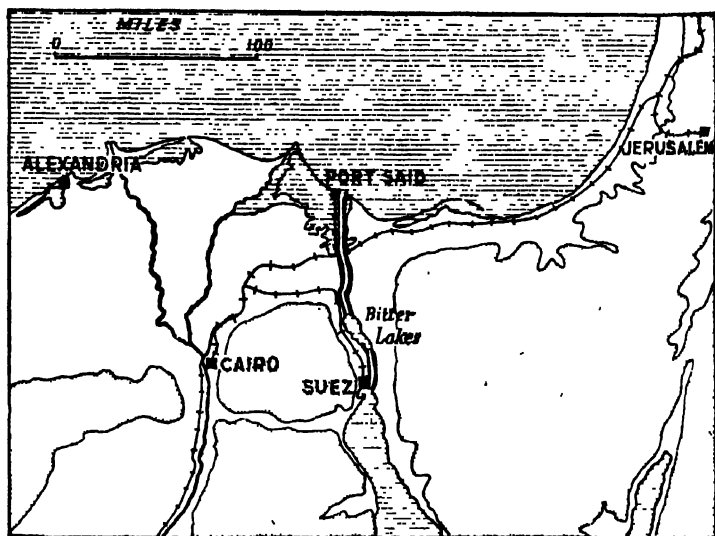


FIG. 348.—The Suez Canal.

Notice that there is no high land near and so there are no locks on the canal.
The highest land passed through is only 50 feet above sea-level.

canal is roughly 100 miles long, but part of that distance is through the Bitter Lakes. At the northern end is Port Said, on the Mediterranean; at the southern end is Suez, on the Gulf of Suez. The canal was built by the French engineer De Lesseps, and finished in 1869. It has since been enlarged but still limits the size of vessels trading between Europe and the East. There are no locks, and the canal is open to the sea at both ends. The Suez Canal is owned by the Suez Canal Company, in which the British Government has some shares, other shares being held by the French. Nearly 5,000 steamers pass through the canal in a year; more than half of them are British.

EXERCISES

1. Population of South Africa. A Census is taken every ten years. The population tables and the statistics may be kept up to date from the *Statesman's Year Book* or the *Year Book of the Union of South Africa*.

2. The foreign trade of South Africa. Figs. 334 and 336 should be kept up to date from the *Annual Report on the Balance of Trade* (League of Nations).

3. Most of the statistics given in this Chapter may be kept up to date from the *Statesman's Year Book*.

EXAMINATION QUESTIONS

1. Give a geographical description of the Congo Basin and refer in particular to the chief exports of the Belgian Congo. (*Univ. London Inter. B. Com.*, 1926.)

2. Describe the course of the Nile and give an account of the part it plays in the economic life of Egypt and the Soudan. (*Univ. London Inter. B.Sc. (Econ.)*, 1926.)

3. Consider to what extent the main types of climate are repeated in Africa north and south of the equator. (*Univ. Oxford Cert.*, 1926.)

4. What reasons have you for believing that the "Cape-to-Cairo Railway" may never be as great a commercial highway as either of the trans-continental railways of Canada? (*Prov. Alberta 3rd Year Matric.*, 1926.)

5. Divide either South-West Africa or Natal into natural regions, explaining your division and adding brief notes on the life of each region. (*Univ. Oxford Dipl.*, 1925.)

6. Give an account of the rivers of British South Africa, grouping them according to their value, present or potential, to Man. (*Univ. Oxford Dipl.*, 1925.)

7. Discuss the main lines of communication between different parts of the Union of South Africa with special reference to geographical features. (*Univ. Oxford Dipl.*, 1925.)

8. What geographical conditions are necessary for sheep-farming? Illustrate your answer by special reference to South Africa and Canada. (*Univ. London Inter. B. Com.*, 1927.)

9. Discuss the importance of railway transport in Africa east of a line joining the mouths of the Nile and Congo, and indicate the main directions in which it is likely to develop. (*Univ. Oxford Dipl.*, 1926.)

10. In what respects has the economic development of Africa south of the equator been assisted or retarded by the historical circumstances of its occupation by European peoples? (*Univ. Bristol Inter.*, 1926.)

CHAPTER XVIII

AUSTRALIA AND NEW ZEALAND¹

GENERAL CONSIDERATIONS

THE island-continent of Australia lies wholly in the Southern Hemisphere and is the only continent so situated. The general term "Australasia" is sometimes used to include Australia, New Zealand, and certain other important land masses, but is generally taken to exclude the multitude of small islands scattered over the surface of the Pacific Ocean. The somewhat older term, Oceania,

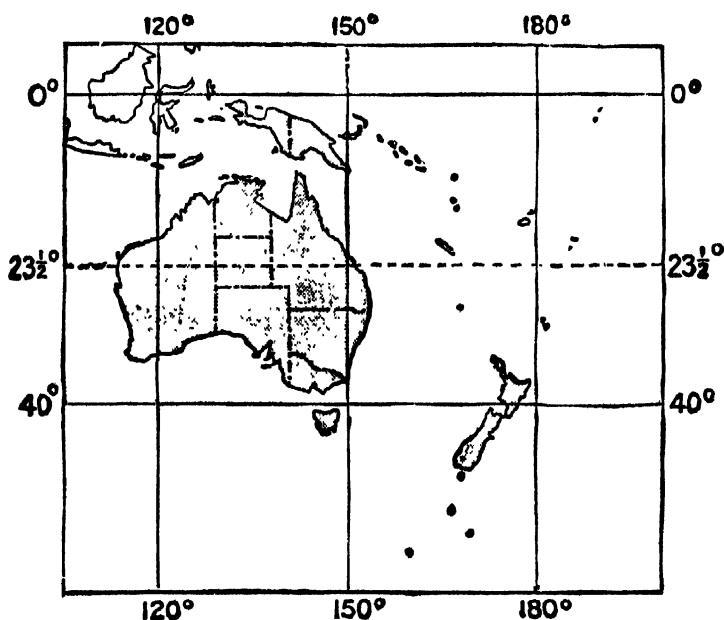


FIG. 349.—Australia and New Zealand. The position of important lines of latitude and longitude.

is inclusive of these islands, some of which, it should be noted, lie north of the equator. The principal land masses included under Oceania are therefore :

(a) Australia which, together with the large island of Tasmania and various small islands round the coasts, constitutes

¹ This chapter is based on the section on Australia and New Zealand in *The World : a General Geography for the Schools of Australia and New Zealand*, by L. D. Stamp and A. G. Price (Longmans).

the Commonwealth of Australia. Australia is the largest island in the world, excluding, of course, the continental masses of Antarctica, the Americas, and Eurasia-Africa.

(b) The two large islands, North Island and South Island which, together with Stewart Island and a number of small groups, constitute the Dominion of New Zealand.

(c) The large island of New Guinea or Papua.

(d) A very large number of small islands scattered over the Pacific Ocean, collectively known as Polynesia (eastern portion), and Melanesia (western portion).

(e) A number of islands lying north of Australia and forming part of the East Indies are usually considered as Asiatic islands, but sometimes as Australian.

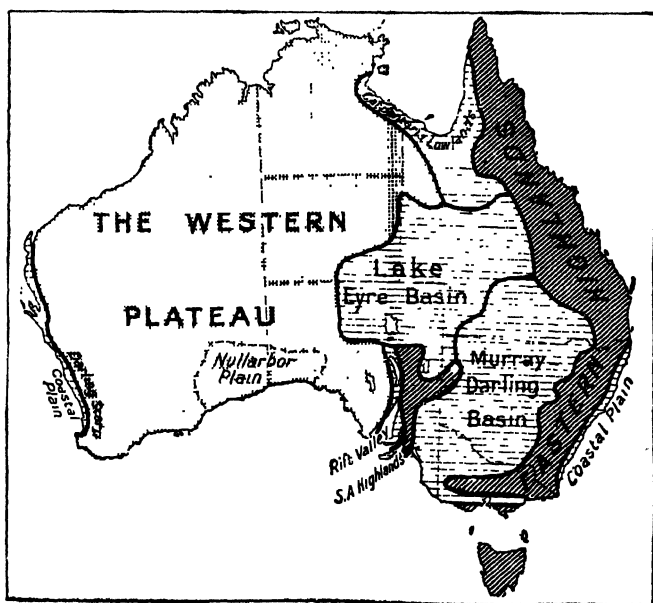


FIG. 350.—The main physical regions of Australia.

Except part of New Guinea and a number of the islands of the Pacific, and the East Indies, the whole of Oceania forms part of the British Empire.

Fig. 349 shows the important lines of latitude and longitude in Australia. The Tropic of Capricorn cuts right through the centre of Australia, so that rather less than half lies in the Tropics and rather more than half in the Temperate Zone. The important states of New South Wales, Victoria, Tasmania, and South Australia, as well as the greater part of Western Australia, lie within the Temperate Zone. The line of latitude of 40° S. passes between Tasmania and

the mainland of Australia and also through the North Island of New Zealand. This is important because the Mediterranean regions of the world lie mainly between latitudes 30° and 40°.

The area of the Australian Commonwealth is roughly 3,000,000 square miles or approximately the same as the United States excluding Alaska. New Zealand, with 104,000 square miles, is larger than Great Britain but smaller than the British Isles. The following table is for reference purposes :

	Area in square miles			Population	
	Whole	Tropics	Temperate	Census 1921	1931
Commonwealth . . .	2,974,581	1,149,320	1,825,261	5,435,734	6,500,536
Queensland . . .	670,500	359,000	311,500	755,972	959,572
N.S.W. . . .	309,432	—	309,432	2,100,371	2,507,055
Victoria	87,884	—	87,884	1,531,280	1,797,459
S.A.	380,070	—	380,070	495,160	583,588
W.A.	975,920	364,000	611,920	332,732	420,616
Northern Terr. . .	523,620	426,320	97,300	3,867	4,654
Tasmania	26,215	—	26,215	213,780	219,133
Federal Capital Terr.	940	—	940	—	8,459
New Zealand . . .	103,862	—	103,862	1,218,913	1,443,070
Papua	90,540	90,540	—	White* 1,128	Native* 275,000
Br. New Guinea . .	91,000	91,000	—	2,900	401,121
Dutch New Guinea .	160,692	160,692	—	487	195,460
Br. Solomon Isles .	11,000	11,000	—	497	93,415
New Caledonia . . .	8,548	8,548	—	57,165	
Fiji	7,083	7,083	—	4,863	184,000
Hawaii	6,449	6,449	—	368,336	
New Hebrides . . .	5,700	5,700	—	1,000	50,000
W. Samoa	1,250	1,250	—	2,935	41,884
French Poss. in Oceania	1,520	1,520	—	36,000	
Other Isles	2,666	—	—	—	
Total, Oceania . .	3,464,891				

* 1933.

AUSTRALIA

Physical Features.— Roughly three-quarters of the land mass of Australia lies between the 600 and 1500-foot contours. The continent may be divided simply into three units (Fig. 350) :

- (1) The Western Plateau.
- (2) The Eastern Highlands.
- (3) The Central Lowlands.

The Western Plateau occupies nearly two-thirds of the whole of Australia, and is almost entirely more than 600 feet above sea-level. It includes the whole of Western Australia, much of South Australia,

and most of the old Northern Territory. Along part of the west coast, as in the neighbourhood of Perth, there is a narrow coastal plain, but along the south the plateau reaches the coast itself and gives rise to cliffs. In the interior and along the south coast there are no rivers; the Trans-Continental Railway, which crosses the southern part of the plateau, runs for over a thousand miles without crossing a single permanent watercourse. In the tropical regions of the north are several rivers, such as the Fitzroy, Victoria, and Roper, which are navigable by launches or small steamers in their lower courses. In the south-west the Helena River has been dammed for water-supply purposes.

The Eastern Highlands vary greatly in character in their course from Cape York in the extreme north to the vicinity of Mount Gambier in the south. In general, however, they present a steep face to the seaward and have a long, gentle slope inland towards the Central Lowlands. Along much of the coast of Queensland the mountains reach the coast; farther south, in New South Wales, there is usually a narrow coastal plain. In Victoria the main ranges turn westwards, and parallel ranges are developed farther south. Tasmania is a mountainous island, forming a detached mass of the Eastern Highlands. In view of the steep eastern face, very important are the gaps which occur at intervals in the highlands, and they have played a leading part in the development of communications and coastal towns. The Cassilis Gate behind Newcastle, the Lake George Gap near Goulburn, and the Kilmore Gate behind Melbourne are specially noteworthy. Along the rocky east coast the land has subsided within recent times geologically and numerous drowned valleys afford excellent harbours, of which Port Jackson (Sydney Harbour) is the most famous. There are numbers of short rivers flowing eastwards into the Pacific Ocean, and some, although their mouths are obstructed by sandbars, are navigable some distance from the sea. The group known as the "North Coast Rivers," including the Clarence, Richmond, and Tweed, is the most important. Brisbane is a river port, on the Brisbane River.

The Central Lowlands lie between the Western Plateau and the landward slopes of the Eastern Highlands, into which they gradually merge. A number of more or less distinct units may be separated :

(a) The Murray-Darling Basin, which contains the only important river system in Australia. The Murray and its tributary the Murrumbidgee both rise amongst the highest mountains of Australia, which are snow-capped for a considerable period of the year. They are never dry, but the volume of water varies greatly from season to season. The Murray is normally navigable as high as Albury from July to January; on the Murrumbidgee the river traffic is mainly below Hay. The Darling,

though above its confluence with the Murray nearly twice as long as the main river, and the Lachlan depend entirely on rain falling on the western slopes of the Eastern Highlands. The Darling can be used for navigation only very intermittently. Normally the river flows between well-defined banks 30 to 40 feet high, but in times of flood has been known to form a spread of water as much as 60 miles broad. Before emptying into the sea the Murray enters into a group of shallow lakes—Alexandrina, Albert, and the Coorong—from which the waters reach the sea by a sand-blocked and shifting mouth, so shallow as to prevent access by ocean-going craft. Navigation on the Murray-Darling system has become less and less important as the importance of the water in irrigation has advanced.

The northern part of the Murray-Darling basin lies in the great artesian area of Queensland.

(b) The Lake Eyre Basin. This is an area of inland drainage, the few streams, which are all non-perennial, flowing into Lake Eyre. Lake Eyre itself has a stretch of salt water occupying its southern portion, but the remainder of the lake is usually a vast salty plain. The northern part of the basin also lies in the great artesian area.

(c) The lowlands round the Gulf of Carpentaria, forming the northern part of the artesian basin.

(d) The Rift Valley of South Australia is occupied by Spencer Gulf, Lake Torrens, and several small but important plains. The Rift Valley is separated from the Murray-Darling Basin by the South Australian Highlands.

Geology.—The three great physical divisions of Australia are determined essentially by geological structure.

The Western Plateau consists of a massif or stable continental block of ancient rocks—metamorphic schists, gneisses, and slates, with intrusions of igneous rocks, especially of granites, and more basic rocks commonly called greenstones. In the south the rocks are mainly pre-Cambrian, in the north are large areas of old Palæozoic sediments. The rocks over the whole plateau were intensely folded at an early date and were worn down into a plateau. For a very long time now in the earth's history it has formed a "stable block," resisting later folding. The area has not always been at its present elevation above sea-level. The south-east was covered by a gulf of the sea in Tertiary times, and the ancient rocks are there covered by a huge stretch of nearly horizontal limestone forming the Nullarbor Plains.

The Eastern Mountains consist mainly of folded rocks of the Palæozoic periods, pierced by masses of igneous rock, especially granite. Like the ancient rocks of the Western Plateau, these old rocks are, in many places, rich in minerals. The main folding

of the highlands took place before the Coal Measure period, and the coal measures lie mainly in basins amongst the older rocks.

The *Central Lowlands* consist for the most part of younger rocks. The *Murray-Darling Basin* is occupied partly by Tertiary sediments laid down in a former arm of the sea, and partly by later alluvium. The *Lake Eyre Basin* and the lowlands round the Gulf of Carpentaria occupy the site of a great gulf of the sea which existed in Cretaceous times. The sediments laid down in this gulf have since been slightly folded into a broad shallow syncline—the famous “Great Artesian

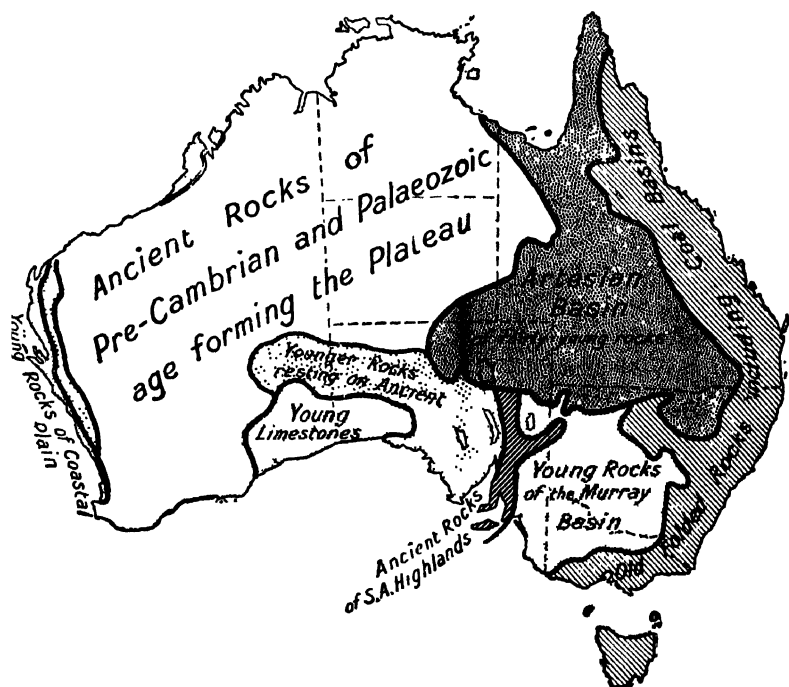


FIG. 351.—Simplified geological map of Australia.

Basin”—the largest of the artesian basins of Australia. The South Australian Highlands consist of ancient rocks which were crushed by earth movements against the ancient massif of the Western Plateau. The highlands consist of a number of plateau blocks with steep escarpments to the rift valley on the west, and more gentle slopes to the Murray Basin on the east.

Minerals.—It was the mineral riches of Australia—more particularly gold—which first attracted white colonists to the continent in large numbers, although the spread of the squatters had already settled wide areas. Although the value of the gold produced has declined steadily in recent years, that of coal has shown a steady

increase, and Australia is also an important producer of silver, lead, zinc, and copper.

Gold.—In the ten years which followed the discovery of gold in 1851, half a million people joined in the gold rushes to Australia. After the initial richness had been exhausted and many of the gold diggers had turned to the development of the land, a new impetus was given to gold-mining by the discoveries at Coolgardie in Western Australia in 1891–2. A graph showing the gold production of Australia has been given in Fig. 172, p. 218. The rapid decline of the value of the gold won annually from 1903 to 1930, since when there has been a rapid rise owing to the increased value of gold measured in terms of Australian currency, should be noted from that graph. Between 1851 and the end of 1935 gold to the value of £665,000,000 was obtained in Australia.

Gold is widely distributed in Australia, being absent only from such areas of young sedimentary rocks as the Murray-Darling Basin and the Great Artesian Basin. The gold of Australia is obtained from each of the main types of deposit mentioned on p. 228 :

(a) In the reef or lode deposits association with copper is common, as in the great Charters Towers field of Queensland.

(b) It was the richness of alluvial deposits which really gave rise to the gold rushes.

(c) The “deep alluvial leads” are really alluvial deposits of much earlier geological age buried deeply under newer rocks. The gold-bearing conglomerates of Western Australia may be compared, in some ways, with the banket of South Africa.

It must be noticed that many of the famous old mines now yield very little gold. The once famous Coolgardie is now almost forgotten, Kalgoorlie is a skeleton of its former self; in Victoria, Ballarat and Bendigo have very small outputs; the Charters Towers field of Queensland is apparently approaching exhaustion. For the world position of Australia, see p. 229.

Silver and Lead.—The annual value of the silver and lead now produced in Australia is greater than that of the gold. The ores of silver and lead tend to occur together and by far the most important area is Broken Hill in New South Wales. Worked since 1883, it is probably the richest silver-lead area in the world, and has resulted in the rise of a town of 30,000 inhabitants in an arid tract which would otherwise be almost uninhabited. Nearly all the traffic to and from the mines passes through Port Pirie in South Australia, where huge smelting works have been built. Other silver-lead mines are Chillagoe and Mount Isa in Queensland; Mount Farrell, Mount Lyell, and Zeehan in Tasmania. See also pp. 231–3.

Zinc.—The production of zinc is at present almost confined to the Broken Hill district. As the richer silver deposits become

exhausted more and more attention is being paid to zinc, and the value is equal to half that of the silver and lead combined.

Copper.—The production from the widely distributed copper-bearing deposits of Australia varies greatly from year to year according to world prices of copper. South Australia was once the leading state, with the Burra, Wallaroo, and Moonta mines as the chief centres, but labour costs and poorer ore has led to the abandonment of almost all the mines. Queensland is probably the richest state in reserves especially in the Cloncurry district, and yet has produced little metal in recent years except from Mt. Morgan. Tasmania's output is mainly from Mt. Lyell; in New South Wales there is a small quantity of copper in the silver-lead-zinc ores of Broken Hill, but the once famous copper mines of Cobar are now no longer worked. The marked fluctuations in production in recent years is shown in the following table :

£		£		£	
1919 . .	1,891,875	1925 . .	775,043	1932 . .	530,542
1920 . .	2,657,756	1926 . .	565,743	1933 . .	531,152
1921 . .	803,957	1927 . .	607,038	1934 . .	500,000
1922 . .	844,126	1928 . .	639,428	1935 . .	500,000
1923 . .	1,245,836	1929 . .	1,075,146		
1924 . .	876,030	1931 . .	567,558		

Tin.—The production of tin from the widely distributed tin ores of Tasmania, New South Wales, and Queensland fluctuated widely, as with copper— from over £1,000,000 in 1920, for example, to less than £216,000 in 1931. Much of the output is from alluvial deposits. In New South Wales tin-mining is centred in the New England states; in Queensland it is widely distributed (1933, £540,000).

Iron.—Iron ores are widely distributed in Australia, but in most cases the richest deposits are far removed from coal, and at present the smelting of the ore and the production of pig iron is almost entirely restricted to the coal field towns of New South Wales. The Lithgow ironworks depend on local supplies of ore, but the larger ironworks at Newcastle use ore from the immense deposits at Iron Knob, South Australia. Iron Knob is a hill about 40 miles west-south-west of Port Augusta and is almost a solid mass of good quality iron ore. The quarries are connected by a private railway with the sea-board at Whyalla, 34 miles away. From thence the ore is carried by sea to Newcastle, the limestone necessary as a flux being obtained from Devonport—again near the coast—in Tasmania. Despite the Government bounty on fencing and rabbit wire, galvanized sheets, and traction engines, the Australian production of iron and steel is still well below a million tons annually. The Australian product finds it difficult to compete with the cheap iron and steel of the United States and Europe. This is partly due to the fact that the industry is very young, but much of the slow

progress is also the result of the high cost of labour, short hours of work, and the great distances separating the deposits of coal and iron.

Coal.—The total value of the coal raised to date is only about a quarter of that of the gold, but the annual value of coal is now roughly equal to that of all other minerals put together. The annual value (1921–36) is roughly £10,000,000—recently lower.

The most important coal fields lie in basins amongst the older rocks of the Eastern Highlands, especially in New South Wales (Fig. 352).

(1) The New South Wales Basin is the largest coal field in the Southern Hemisphere. In almost the geometrical centre

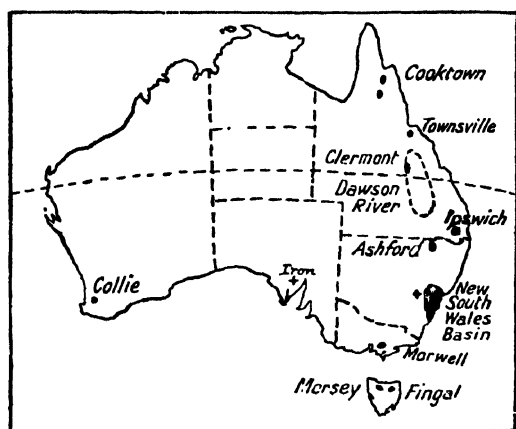


FIG. 352.—The coal fields and principal iron fields of Australia.

of the basin lies Sydney, but the coal is at present worked mainly at or near the outcrops in :

- (a) The Northern or Newcastle Field.
- (b) The Western or Lithgow Field.
- (c) The Southern or Illawarra Field.

The lower or Greta seams are now extensively worked between West Maitland and Cessnock in the northern area, which is the premier coal-producing region of Australia. Reserves of good coal in the New South Wales Basin alone are known to be at least 20,000 million tons—equivalent to about 15 years' world supply at the present rate of world production. Probable reserves are five times this quantity.

(2) The Dawson River Basin in Queensland is a huge undeveloped field with excellent coal. Coal is worked farther north at Clermont.

(3) Small fields with excellent coal occur at Ashford in New South Wales; in the Mersey River area in Tasmania; near Townsville and near Cooktown (two) in Queensland. The small Collie coal field of Western Australia has a poorer quality.

All the above coal fields are of Permo-Carboniferous age. In addition Australia has a number of fields with coal of a later age. The Triassic and Jurassic coals may be almost as good as the older Permo-Carboniferous coals, but the Tertiary basins yield only brown coals or lignites.

(1) The Ipswich Field, in Southern Queensland, furnishes coal which is excellent for the manufacture of coke. The field is a large one and extends into New South Wales (Clarence and Richmond River Fields), but the coal there is good enough for local use only.

(2) The Fingal Field, Tasmania, furnishes coal similar to that of Ipswich.

(3) The brown coal reserves of Victoria are estimated to exceed 10,000 million tons. The Morwell deposits have been opened up by an open mine at Yallourn and electricity is being generated to supply Melbourne and a large area. A plant has also been installed which produces 250,000 tons of briquettes a year.

Other Minerals.—In recent years much attention has been given to the search for mineral oil in Australia. On the whole the geological structure of the continent is unfavourable and results have been disappointing. Extensive deposits of oil shale are known in Tasmania and New South Wales, and may later become of commercial importance (see p. 212). Large quantities of salt are obtained from shallow lakes in South Australia, chiefly in Yorke Peninsula, and from lakes in Northern Victoria as well as by the evaporation of sea-water in South Australia, Victoria, and Western Australia. Among gemstones, the Lightning Ridge Field of New South Wales, the Opalton area of Queensland, and the Stuart's Range Field of South Australia are all famous for their fine opals. Sapphires, a few diamonds, arsenic, antimony, cobalt, gypsum, molybdenite, osmiridium, and platinum are also obtained in Australia.

Climates.—The climatic conditions of Australia are controlled by certain dominant factors:

(1) *Latitude.*—The Tropic of Capricorn passes right through the continent, the latitude of 40° S. lies between Australia and Tasmania. In December, in the southern summer, the sun is thus shining vertically over Australia, and the whole continent (excepting Tasmania) lies in the Trade Wind Belt, and the prevailing winds are from the east (South-East Trades). Owing

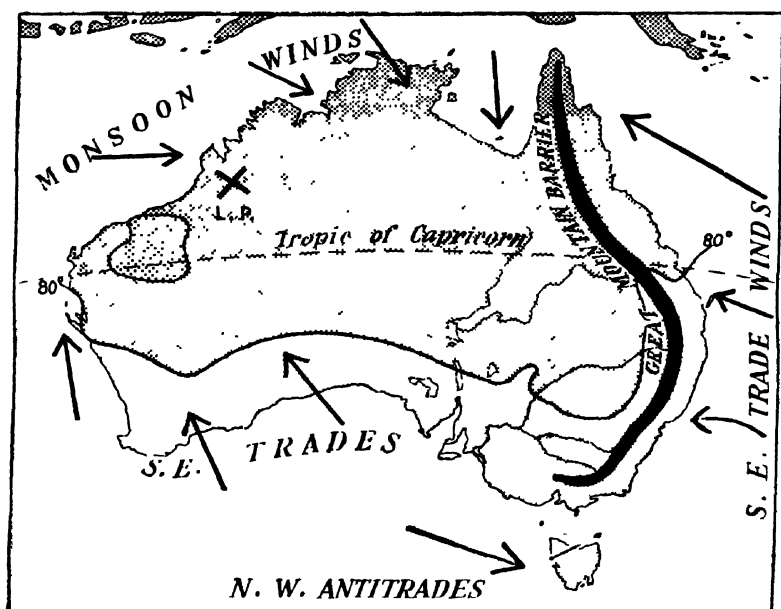


FIG. 353.—Climatic conditions in the hot season (November to April). Notice the low pressure centre (L.P.) in the north caused by the great heat, and notice the monsoon winds which it causes.

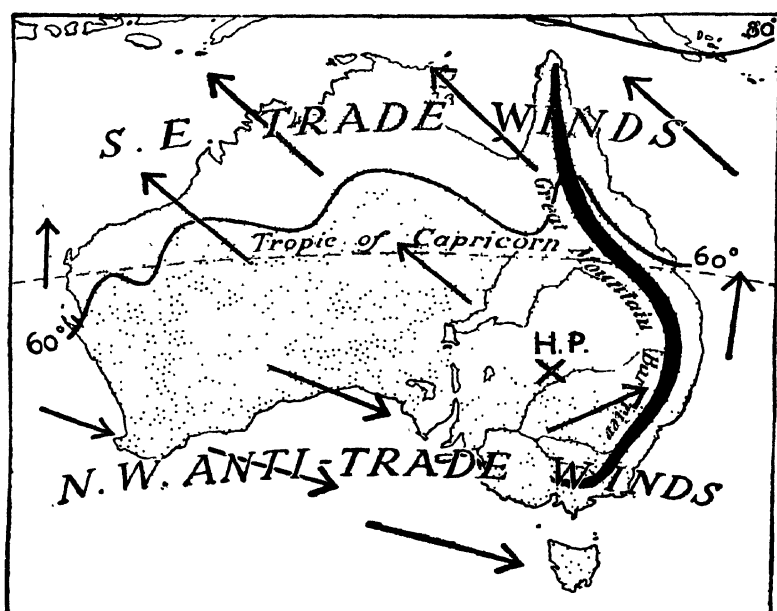


FIG. 354.—Climatic conditions in the cold season (May to October). Notice how the main wind systems have moved northward and that the southern coast comes under the influence of the Anti-Trade Winds.

to the great heat over the heart of the continent a monsoonal effect is developed over the north-west. In the southern winter, Northern and Eastern Australia lies still in the Trade Wind Belt, but the southern coasts come under the influence of the Westerlies (North-West Anti-Trades).

(2) *Configuration*.—At all seasons the Eastern Highlands form an effective barrier to the penetration of the Trade Winds, and the fact that the western half of Australia is an elevated plateau prevents the effective penetration of the monsoons along the north-west coast in summer and the westerlies along the south in winter. It follows that only the margins of the continent have an adequate rainfall; the interior is everywhere arid.

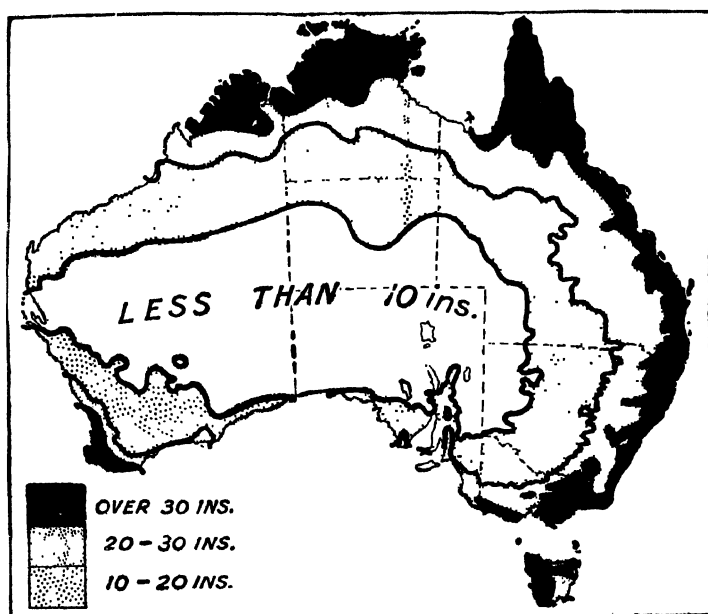


FIG. 355.—A simplified rainfall map of Australia.

Figs. 353 and 354 illustrate temperature and wind conditions in January (summer) and July (winter). Fig. 355 is a simplified rainfall map of Australia. Certain of the same rainfall lines are repeated on Fig. 356, which also indicates the seasonal distribution of rainfall. In the dry heart of Australia the rainfall is not only very meagre but also very unreliable. This is illustrated in Fig. 357.

During the winter the greater part of Australia, south of the Tropics, is subject to ground frosts. A frost map (Fig. 358) has been included because of the importance of frost in agriculture, but Australia does not suffer in the same degree as South Africa from

harmful late spring frosts (October and November) or equally harmful early autumn ones (March and April).

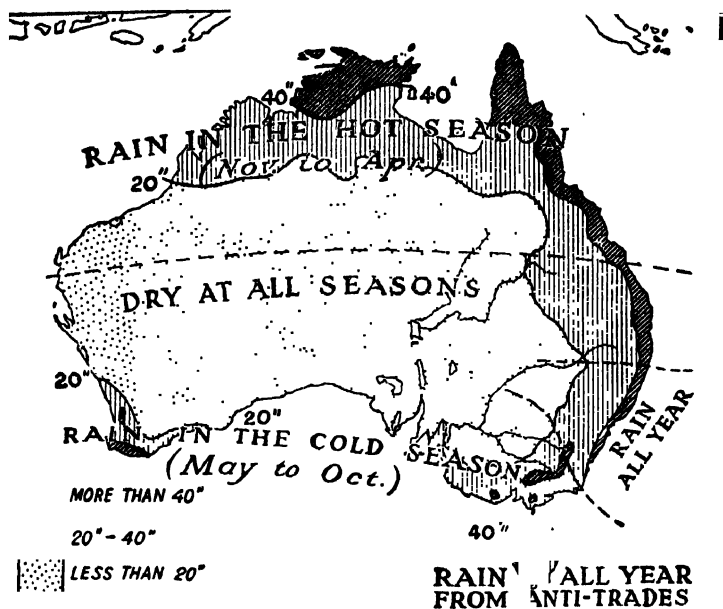


FIG. 356.—The seasonal distribution of rain in Australia.

In the Tropics 20 inches of rainfall may be regarded as roughly a minimum for agricultural development; in the Temperate regions 10 inches is sufficient.

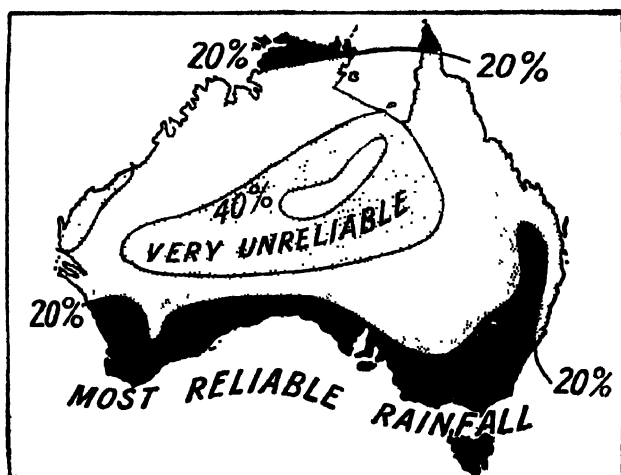


FIG. 357.—Rainfall reliability (after Prof. Griffith Taylor).

Climatic Regions.—Fig. 359 shows a division of Australia into climatic regions, which have been fully described in Chapter IV.

The Tropical Climate has the typical summer rainfall due to the Trade Winds in the north-east, but accentuated by a monsoon in



FIG. 358.—Frost map of Australia.

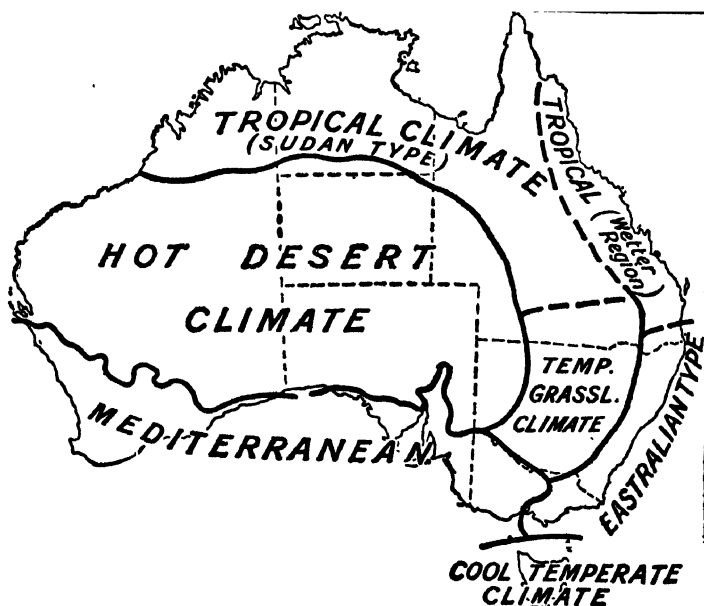


FIG. 359.—The climatic regions of Australia.

the north-west. Along the north-west coast the climate is, indeed, a Tropical Monsoon Climate (see graphs of Darwin in Fig. 40, p. 48). *The Hot Desert Climate* is found over a large area in the heart of Australia and lies in the same latitudes as other hot deserts of the world. *The Mediterranean Climate* occurs typically in the south-west of the continent (see the graphs of Perth in Fig. 45, p. 56), and in South Australia and the western part of Victoria. The eastern part of Victoria really receives too much rain in the summer months to

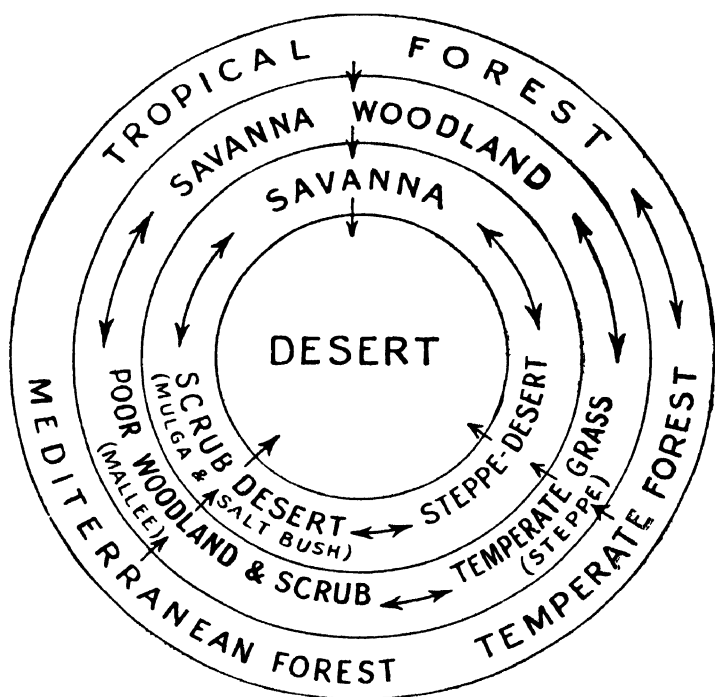


FIG. 360.—A diagrammatic scheme to explain the distribution of vegetation in Australia.

(Note: Savanna is more correctly spelt savana unless the form savannah is used.)

be considered a typical Mediterranean area; it may be considered intermediate in character between the Mediterranean, the Warm Temperate and the Cool Temperate. The area shown in Fig. 359 as having the 'Eastralian' type described on pp. 60-1, is sometimes classed with that of China, with a much smaller range of temperature than in the true China type of China. *The Cool Temperate Climate* of Tasmania is typical but the *Temperate Grassland Climate* of the Murray-Darling Basin has a much smaller range of temperature than is found in the grasslands of the Northern Hemisphere. See the figures given for Bourke on p. 69.

Natural Vegetation.—The natural vegetation or "bush" of

Australia does not exhibit the variations which one might expect from the great differences in climate. There is not, for example, the contrast one would look for between the forests of Queensland, Victoria, and Western Australia. This is owing to the fact that Australia was cut off from Asia at an early date, and has a fauna and flora highly peculiar to itself. The most characteristic trees are the various eucalypts or gum-trees. Most of them have a somewhat sparse, grey-green foliage, evergreen but with the edges of the leaves turned towards the sky. Other characteristic plants are the acacias, and the salt-bush and blue-bush of arid tracts. Bearing in mind the sameness in the scenery due to the wide distribution of the eucalypts,

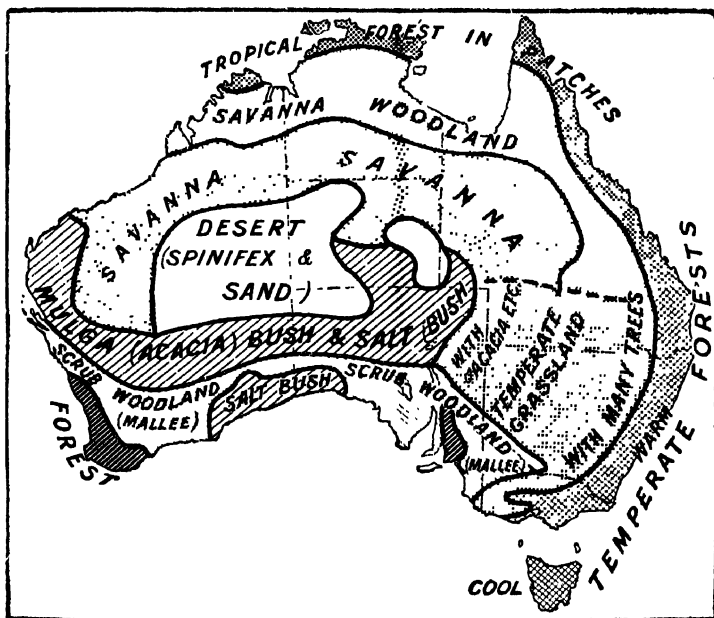


FIG. 361.—The natural vegetation of Australia.

each type of climate has its characteristic vegetation. Fig. 360 illustrates the mutual relationships of the vegetation, Fig. 361 its actual distribution. Figs. 361 and 359 should be studied side by side.

With a *Tropical Climate* the patches of tropical forest in the wettest parts give place to savanna-woodland and then to typical savanna. With a *Mediterranean Climate* the forest of the wettest parts gives place to a scrub woodland in which mallee (a small eucalypt) is the principal bush, and then to a scrub of mulga (an acacia) and salt bush. The typical vegetation of the *Eastralian Climate* is a eucalypt forest: inland this passes gradually through

a grassy forest to savana-like grasslands and then into the temperate grasslands of the Murray-Darling basin, with a *Temperate Grassland Climate*. The Cool Temperate Forests of Tasmania are in part eucalypt forests like those of the mainland, but large tracts of beech forest also exist and render a closer comparison with Europe possible.

Forests and Forestry.—Australia as a whole cannot be described as a continent rich in natural forests. Forests of good timber trees occupy less than one-sixtieth part of the Commonwealth—the official estimate being 1.29 per cent. The natural forests occur in five main areas :

(1) Blue Gum and other Eucalypt Forests occupy the crests and coastal slopes of the mountains of New South Wales and Victoria, including the Gippsland and Otway Hills.

(2) Tropical Forests occur irregularly down the eastern coast of Queensland and in the extreme north of Northern Australia. Unlike most of the forests of Australia some of the trees yield soft timber.

(3) Stringybark and Blue Gum Forests occur on the ranges of the South Australian Highlands.

(4) Fine karri forests (about 1,000,000 acres) as well as jarrah forests (about 8,000,000 acres) occur in the south-west of Western Australia.

(5) Important forests cover a large area in Tasmania.

Besides timber, the Australian forests yield large quantities of firewood, eucalyptus oil (obtained from the leaves), and barks used in tanning. Good tan bark is yielded by the golden and black wattles, but the greatest quantity is now obtained from plantations of Australian wattles in South Africa. In the years following the Great War the total value of forest produce approached £10,000,000 a year, a figure almost maintained. Australia exports hard timber—which has a good reputation in South Africa, Great Britain, New Zealand, etc., for railway sleepers, wood-paving, and furniture—but in decreasing quantity, and imports soft timbers for building to the value of four times the amount of the export. The bulk of the softwood timber is now imported from the United States, Canada, New Zealand, Scandinavia, and Japan; but both in Australia and New Zealand large areas are being planted with *Pinus radiata* and other softwood trees.

The danger of introducing wild or semi-wild plants into a country where they are free from hereditary enemies has been seen in Australia in the case of the Prickly Pear, which is proving a serious pest and has rendered useless thousands of acres in Queensland and New South Wales. In the animal kingdom the same thing is seen in the case of rabbits, introduced by early settlers, which have multiplied at an enormous rate. They eat every vestige of green

stuff from large tracts of land and so render vast areas unfit for sheep, and huge sums of money have been spent, often largely in vain, on rabbit-proof fences to prevent their spread.

Agriculture.—Primary production from agriculture, pasturing dairying, mining, and forestry is the mainstay of Australian prosperity. In 1928-29 primary products were valued at £388,000,000, manufactures at £160,000,000 (lower in later years).

Wheat.—Wheat is by far the most important crop in Australia. It occupies an area of nearly 15 million acres (season 1929-30) or nearly two-thirds of the total land under crops on the continent.

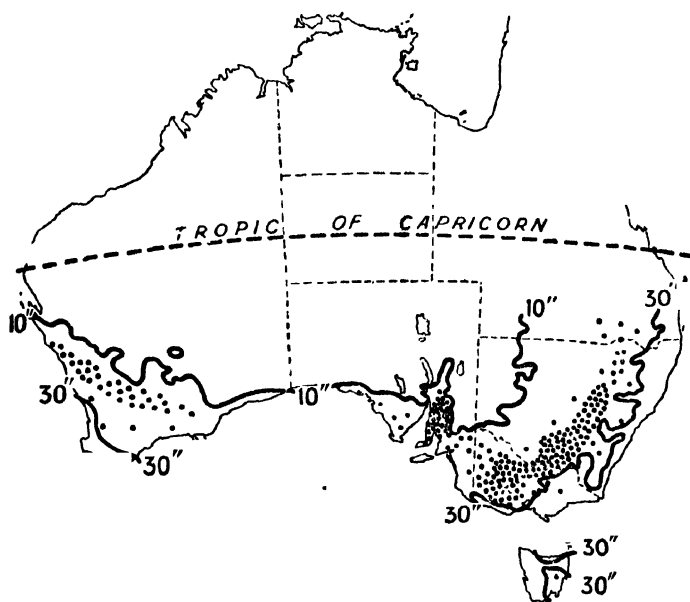


FIG. 362.—The distribution of wheat in Australia.

Each dot represents a yield of 500,000 bushels on an average in the years 1920-1935. Notice that all the wheat is grown south of the Tropic of Capricorn, and nearly all where the rainfall is between 10 and 30 inches—it is grown especially between 20 and 30 inches.

Even then, this area is less than 0.8 per cent. of the area of the continent. The Wheat Belt of Australia lies entirely outside the Tropics and almost entirely between the isohyets of 10 inches and 30 inches (Fig. 362). It will be noticed that the Wheat Belt lies mainly in the areas of Mediterranean and Temperate Grassland Climate. Farming practice differs considerably from that of other lands. In the spring-time—July and August—the ploughing for the next year's crop takes place. The ploughing is deeper in the lighter soils, but may be only 3 or 4 inches in heavy clays. The surface is then harrowed and raked over with a scarifier or cultivator.

The fine surface layer so formed prevents loss of water from the lower layers of the soil, and renewed harrowing after each shower prevents the hardening of the surface. The preservation of this powdery surface layer is the basis of the Australian "Dry Farming" system. Sheep are often turned out on the fallow to keep it clear of weeds and to enrich the soil by their manure—hence mixed sheep and wheat farming. The seeds are sown by drill in the autumn—about April, after the first autumn rains—the sowing being preceded by harrowing. Rains may be expected during June, July, and August, but the critical period when rain is essential is October and early November. Fig. 363 shows the close connection between winter rainfall and total yield. The earliest varieties of wheat are ready for harvesting in December. Owing to the dryness and firmness of the wheat stalk, combined with shortage of labour, Australia

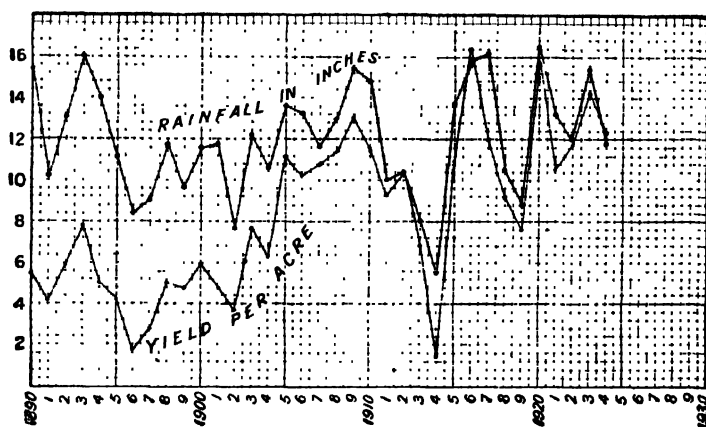


FIG. 363.—Graph showing the close connection between winter rainfall (April to November) and yield of wheat. This graph also illustrates the steadily improving yield.

The graph is based on the figures for the wheat-growing lands of South Australia. (After A. G. Price.)

evolved as early as 1843 the machine known as the stripper. This machine America and Australia have improved into the harvester, which not only cuts the wheat but threshes it and puts the grain into bags. The only operation left is the sewing up of the bags. The area under wheat in Australia grew steadily up to 1915-16, when a special war-time effort led to the cultivation of $12\frac{1}{2}$ million acres and a production of 179 million bushels. Bad seasons and post-war conditions resulted in a serious decline, so that in 1919-20 the acreage fell to less than $6\frac{1}{2}$ million acres, producing only 49 million bushels. Since then there has been a steady recovery, and the normal acreage may be regarded as over 16 millions and the crop over 180 million bushels (5 million metric tons). New South

Wales (32–38 per cent.) leads in acreage and total yield; Victoria and South Australia are close rivals for second place whilst production in Western Australia is rising steadily. In the existing Wheat Belts there is ample room for extension of cultivation. Even in the best years only about a fifth or a sixth of the available land is in use. There is still ample room for improvement in the common yield of 12 or 13 bushels per acre (see pp. 95–6). Despite her huge production Australia only grows about 4 per cent. of the world's total. But nearly half Australia's crop is available for export, and Australia ranks fourth as an exporter (see Fig. 66, p. 99). Australian wheat has a high reputation for its whiteness, and often commands the highest prices in the world's markets. Half the export goes to the United Kingdom, much of the remainder to the countries of North-Western Europe and Italy, but Japan is also a good customer.

Oats.—Oats come next in order of importance amongst the cereal crops of Australia, but cover only a little more than one-tenth of the area devoted to wheat. As usual, they grow in damper and cooler regions than those favouring wheat and half the crop is grown in Victoria. Apart from a small proportion (10–15 per cent.) consumed in making oatmeal, oats are used as fodder.

Barley.—Despite wide fluctuations, the area devoted to

barley has shown a marked tendency to increase steadily in recent years. The bulk is malting barley for the local brewing industry. The surplus, if any, goes mainly to Great Britain.

Maize.—Maize is grown for grain in Queensland and New South Wales, but mainly for fodder in the other states. It is curious that, with climatic regions eminently suitable, Australia does not grow enough of this cereal to satisfy her own requirements, and imports an additional quantity from South Africa. An increase in production may be expected when the value of the crop in fattening stock becomes generally appreciated.

Hay.—Next to wheat, hay covers the largest area of any crop—nearly a fifth of all the cultivated land. A large proportion consists,

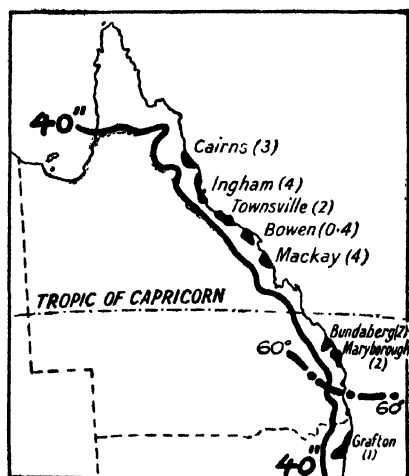


FIG. 364.—The distribution of sugar cane in Australia.

Notice that all the sugar cane is grown where the rainfall is more than 40 inches per year, and nearly all where the temperature is above 60° for the three winter months. The figures show number of acres (in 10,000) on an average for the years 1920–24. (*In part after James and Easterby.*)

not of the meadow grasses of other lands, but of wheat, oats, and lucerne. The dairying industry depends largely on hay and green fodder, and much lucerne is grown for sheep. Ensilage is little used.

Potatoes and other root crops are grown especially in Victoria.

Sugar.—The sugar cane flourishes in the warm coastal strip of Queensland (see Fig. 364). Despite the difficulties of cultivation

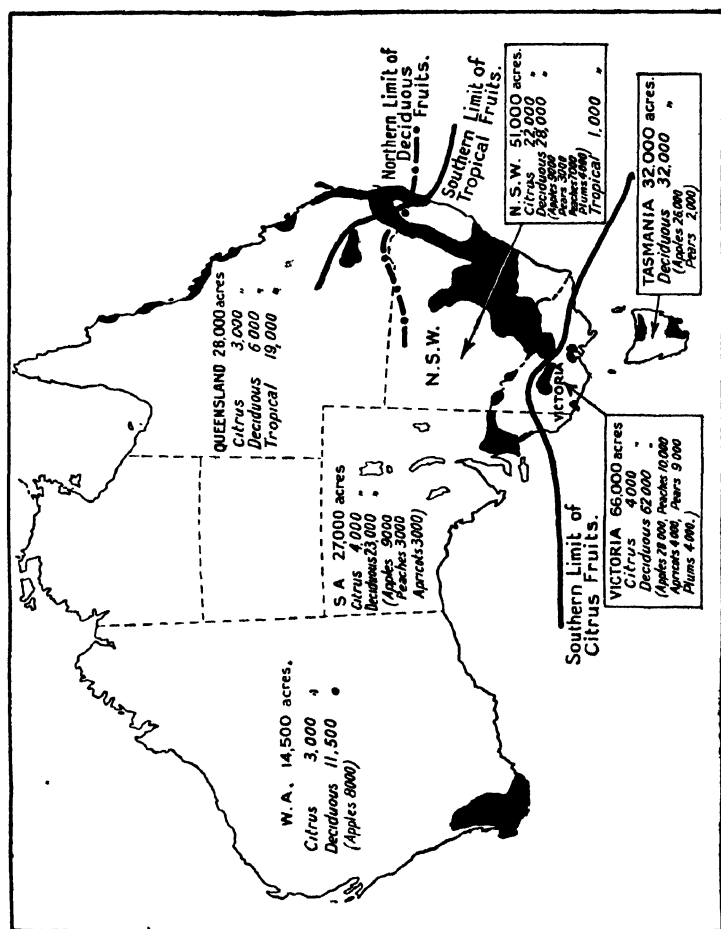


FIG. 365.—The distribution of fruit in Australia, 1932-33.

The majority of fruit orchards are within the areas marked in black, but are irregularly distributed.

by white labour under the White Australia Policy, Australia produces more than sufficient to supply her needs.

Fruits.—The fruit-growing industry of the Commonwealth is now a very important one, and is increasing rapidly. Fig. 365 shows that all four classes of fruit mentioned on p. 137 are grown. Owing to the fact that the seasons are reversed when compared with Europe, Australia shares with South Africa the advantage of

being able to supply fruit to the European markets when it is scarce in the Northern Hemisphere. Study carefully the distribution of fruits shown on Fig. 365. For deciduous fruits Victoria and Tasmania are pre-eminently the fruit-growing states. The export from Australia of fresh apples alone is valued at nearly a million pounds sterling. Dried nectarines and peaches are also particularly important. Vineyards (114,000 acres in 1933-34) are specially important on the sunny slopes of the South Australian Highlands (50,000 acres) and on the irrigated lands of the Murray Basin. Wine-making, drying of raisins and currants are all noteworthy, and Australian products are making a bid for the European markets, especially Great Britain. The principal Australian fruits figuring as exports are apples and oranges, raisins, dried peaches, and apricots.

Minor Crops.—Parts of Queensland are climatically suitable for cotton. The principal difficulty is the labour supply.

Live Stock.—*Sheep.*—The breeding of sheep for the sake of their wool is the most important of all the agricultural and pastoral industries of the Commonwealth, as well as one of the oldest. It has already been shown in Part I (pp. 174-176) that Australia has the largest flock of sheep in the world (112,000,000 in 1933), producing a fifth of the world's wool. The climatic control of sheep-rearing is illustrated in Fig. 144 (p. 174). Although attention is now being paid to the rearing of good mutton-sheep much of the Australian pasturage is suited only to wool-sheep. In the drier parts the sheep are allowed to wander over large areas in search of food. It is here that the competition of the ubiquitous rabbit is very serious. Over large areas of the drier parts salt-bush and blue-bush afford good food, but do not quickly recover when closely cropped by sheep. Under existing conditions it is doubtful where the number of sheep in Australia could be profitably increased; improvement in the weight of the average fleece is the obvious line of progress. Australian wool is mainly from the merino sheep, and the average pre-war production was 700 million lb., recently 1,000 million. Most of the wool is sold before export, the leading marts being Sydney, Melbourne, Geelong, Brisbane, Adelaide, Perth, Hobart, and Launceston. It is exported mainly in the grease. Of recent years Australia has begun seriously to turn her attention to the home manufacture of woollen goods, and there are mills at Geelong, Sydney, and elsewhere, the annual output of which now exceeds £10,000,000 in value.

Cattle.—Although the rearing of cattle is not nearly such an important industry as the rearing of sheep, there are over 13,000,000 cattle in Australia. Beef cattle flourish on the ranching country of the savanas of Northern Queensland, Northern Australia, and Western Australia. Dairy cattle are kept in the wetter parts of

the temperate regions, especially on the coastal sides of the Eastern Highlands in Victoria and New South Wales. The local consumption of beef is very large, and between 80 and 90 per cent. of the beef produced is eaten in Australia. Of recent years there has been a steadily growing production and export of butter, preserved milk, and cheese.

Horses.—Horses flourish on the grasslands and are still very important in agricultural operations. Australian horses, including racehorses, have a high reputation.

Pigs.—Under normal conditions there are nearly a million pigs in the Commonwealth, mainly in Victoria, New South Wales, and

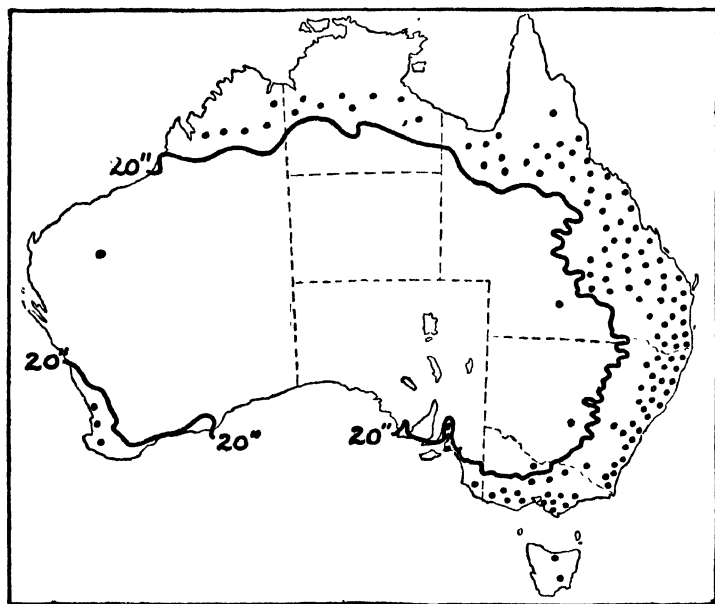


FIG. 366.—The distribution of cattle in Australia.

Each dot represents 100,000 cattle in 1924. Notice that they are nearly all found where the rainfall is more than 20 inches per year.

Queensland. The production and export of bacon and ham and lard reached high figures during the latter part of the War.

Poultry-keeping and *bee-keeping* are both industries capable of considerable expansion.

Artesian Water and Irrigation.—In a country such as Australia where the rainfall over a large area is very low and where even the scanty rainfall is irregularly distributed from year to year, irrigation and conservation of water are matters of great importance. Australia is fortunate in possessing a number of artesian basins, which are shown in Fig. 367. The artesian basins mark the sites of old gulfs of the sea which have been filled up with porous sandstones

overlain by impervious blue clays and other rocks. The water is imprisoned in the porous sandstones until the covering layer of clay is pierced. Whilst some geologists believe that the water originated deep down in the earth's crust and when used up will not be renewed, the majority hold that it is replenished by rain falling on the edges

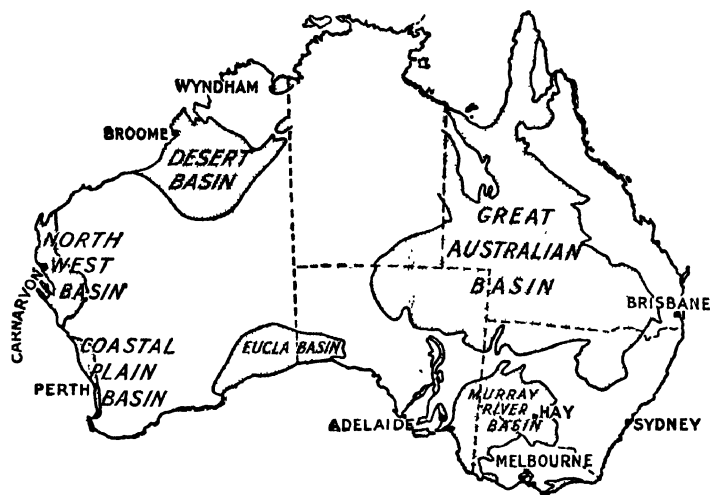


FIG. 367.—The artesian basins of Australia.

(From Report of the Fourth Inter-State Conference on Artesian Water.)

of the basins. The more important artesian basins of Australia are :

(1) *The Great Australian Basin* covers more than half a million square miles, including half of Queensland. In Queensland alone there are more than 1,000 bores, in New South

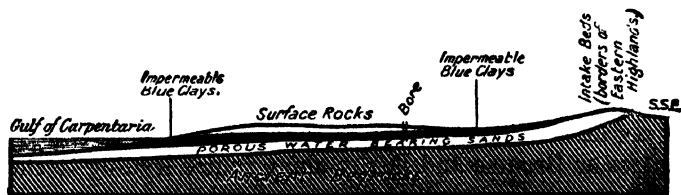


FIG. 368.—Section across the great artesian basin of Australia.

Notice the difference from the simple basin type.

Wales over 500, and in South Australia 200. The yield of water from flowing bores alone is about 450 million gallons per day. The water is excellent for watering stock, and is of paramount importance in the Queensland cattle industry. The deepest bores are over 5,000 feet in depth and the water issues at a high

temperature. It contains a considerable proportion of mineral salts, especially sodium carbonate, which would, in course of time accumulate in the soil if the water were used for irrigation, for which it is not, therefore, suitable.

(2) *The Murray Basin* has not yet been greatly developed because water for irrigation is available from the Murray River.

(3) *The Eucla Basin* occurs in a part of Australia which is particularly dry and where water for irrigation is greatly needed. Unfortunately, in most parts of the basin the water is too heavily charged with salts to be suitable either for watering stock or for agriculture, and little has yet been done to develop the basin.



FIG. 369.—The irrigation works on the Murray and Murrumbidgee in New South Wales and Victoria.

(4) *The Coastal Plain Basin* supplies water to Perth, and a somewhat similar basin exists on the Adelaide Plains, whilst the *North-West* and *Desert Basins* in Western Australia have been as yet little utilized except to supply water at intervals to such centres as Broome and Derby along routes leading to them.

River Irrigation Works are important in the Murray Basin—the Nile of Australia. The use of the water has been regulated since 1914 according to the Murray Waters Agreement, and since 1917 irrigation and navigation schemes have been controlled by the River Murray Commission, the cost being shared equally by the Commonwealth Government and the Government of each of the three states concerned. The three great projects finally brought to completion in 1937 were :—

(a) The Hume Reservoir, near the junction of the Mitta Mitta and the Murray.

(b) The Lake Victoria Storage, to supply South Australia.

(c) The construction of 26 weirs and locks on the Murray and 9 on the Murrumbidgee.

Earlier works include :

(a) The Murrumbidgee Irrigation area, supplied by the Burrinjuck (Barrenjack) Dam, 200 miles away—now a leading fruit and dairying district.

(b) The Curlwaa Irrigation area, supplied by water pumped from the Murray.

(c) The Goulburn Irrigation area, supplied from the Goulburn Weir.

(d) The Murray River Irrigation schemes, supplied by water from a weir 20 miles below Echuca.

(e) The Loddon River scheme, utilizing to a small extent the waters of the Loddon.

(f) Mildura, a small but intensely cultivated area supplied by water pumped from the Murray.

(g) Renmark and other irrigation areas in South Australia—important fruit-growing areas.

There are large numbers of smaller irrigated areas as well as water schemes under which the water is used for stock and domestic purposes only.

Population.—In 1850, before the discovery of gold, the population numbered a little over 400,000. By 1860 it had risen to 1,145,585. The census of 1921 showed 5,435,734 not including aborigines. The census of 1933 showed 6,625,000. Owing to a low death rate natural increase is fairly rapid—10 per annum per 1,000. Australia is still very thinly populated, with an average density of under 2 per square mile. This may be compared with the United States, about the same area, with 40. Although the Commonwealth depends for its prosperity on its agriculture and pastoral industries, only one person out of every three lives in the country. Nearly half the total population is concentrated in the six capital cities. Taking Australia as a whole, 95 per cent. of the population lives in the temperate regions, south of the Tropics. The greater part of Tropical Australia is virtually uninhabited. With the exception of the mining centres of Kalgoorlie and Broken Hill, the “dry heart” of Australia with less than 10 inches of rain (see Fig. 370), is also almost uninhabited. Although it is probable that more than a third of the continent—the arid interior—will never be appreciably developed (unless by mining), there is room for a big expansion in the temperate regions already populated and in the tropical regions with a good rainfall at present almost uninhabited.

Over 99 per cent. of the Australian population is of European descent. There are 59,000 aborigines, 19,000 half-castes of various kinds, and 17,000 Chinese. Under what is known as the "White Australia Policy," the immigration of Asiatics and other non-European races has long been stringently restricted. Two important problems face the Commonwealth :

(a) Whether the tropical regions can ever be effectively developed without the help of coloured labour.

(b) Whether Australia will be reasonably able to prevent the influx of Asiatics when the extent of her undeveloped but desirable tropical regions becomes generally known in Asia.

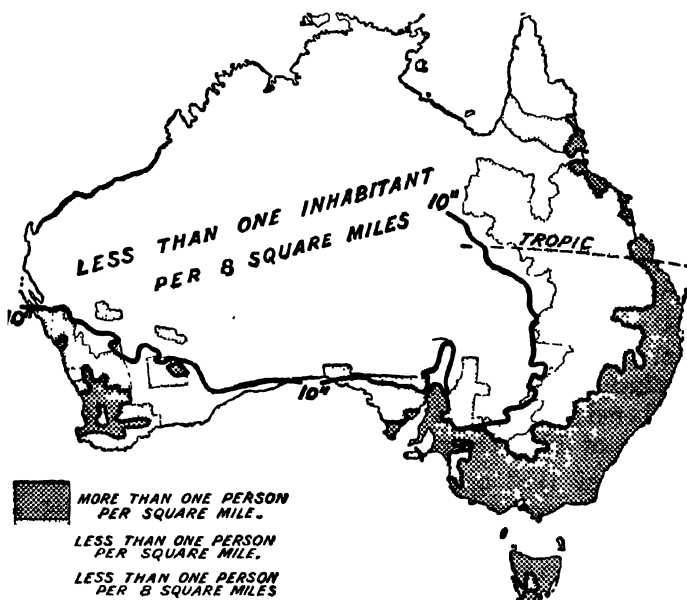


FIG. 370.—The distribution of population in Australia.
(Adapted from the *Commonwealth Year Book*.)

In the meantime, the Commonwealth is encouraging the immigration of Europeans and is making considerable progress in the development of tropical Queensland by European labour.

Communications.—Railways.—It has already been explained (p. 249 and Fig. 196) that the Australian railway system grew up gradually round a number of independent points—the state capitals—each centre formulating its own policy independently of the others. Hence the mixture of gauges which is the great drawback of the Australian railways at the present time. The *Queensland Railways* are on the narrow or 3 feet 6 inches gauge ; until recently there were

four groups of lines connecting the ports of Cairns, Townsville, Rockhampton, and Brisbane with their respective hinterlands. These have now been linked together by a coastal line. The *New South Wales Railways* are on the standard gauge (4 feet 8½ inches) and radiate in all directions from Sydney. The difficulty of crossing the Blue Mountains was not surmounted till 1875, and the bridging of the Hawkesbury River between Sydney and Newcastle was not completed till 1889. A coastal line between Sydney and Brisbane has now been completed; but there is not yet a coastal line to Melbourne. Two of the three chief lines inland from Sydney make use of well-known natural gaps—the Cassilis Gate and the Goulburn Gap. The *Victorian Railways* are on the broad (5 feet

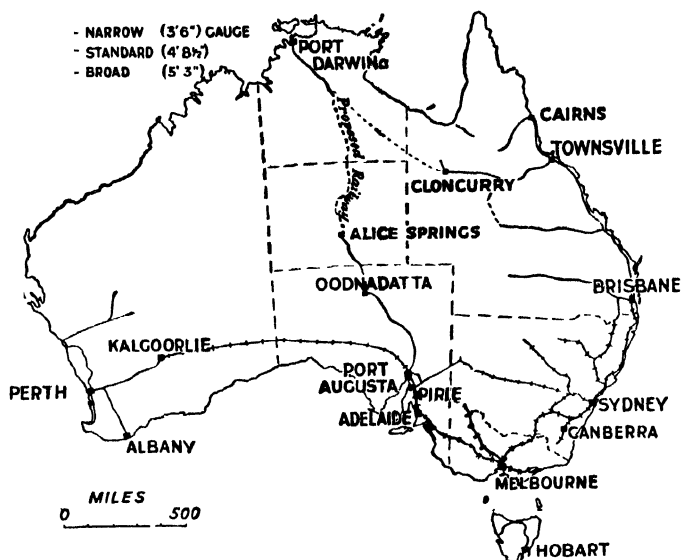


FIG. 371.— The principal railways of Australia.

3 inches) gauge and radiate from Melbourne. The broad-gauge line extends to Adelaide. The *South Australian Railways* use all three gauges (see Fig. 371). The *Trans-Continental Railway*, completed in 1927, connects Port Augusta in South Australia with Kalgoorlie in Western Australia. It is on the standard (4 feet 8½ inches) gauge. It is owned and operated by the Commonwealth, as will be the north-south continental line from Darwin to Alice Springs which has long been projected. The *Western Australian Railways* (3 feet 6 inches) radiate from Perth and serve particularly the agricultural regions, especially the Wheat Belt. The *Tasmanian Railways*, on the narrow gauge, afford interesting examples of the way in which railways in mountain country are forced to follow river valleys.

Roads.—It cannot be said that Australia is, as yet, well supplied with good roads. The Prince's Highway, following the coast, affords an alternative route to the railway from Sydney to Melbourne and Adelaide, but elsewhere the roads supplement and feed rather than replace the railways. Fortunately, much of Australia is comparatively level and free from permanent water courses, so that in the dry season the ubiquitous motor-car can be used, almost without need of definite roads, to communicate with outlying states.

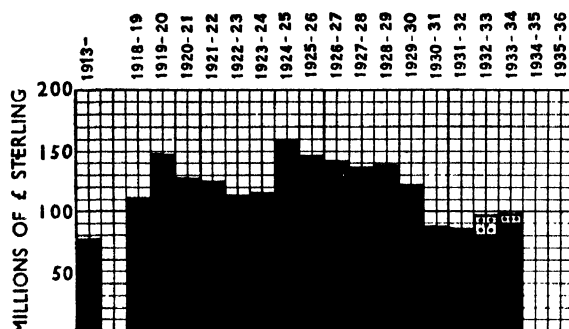


FIG. 372.—The exports of Australia (total exports of Australian produce, including gold shown dotted in later years).

(From the *Statesman's Year Book*.)

(In £ Australian, 1931-32 = £mn. 105.3; 1932-33 = £mn. 121.3; 1933-34, £mn. 122.2.

Aerial Transport.—Reference has been made on p. 249 to the use made of the aeroplane in linking up outlying stations not yet served by rail. Mail services are now largely by air.

The Foreign Trade of Australia.—Owing to the large and increasing urban population of Australia, a number of products

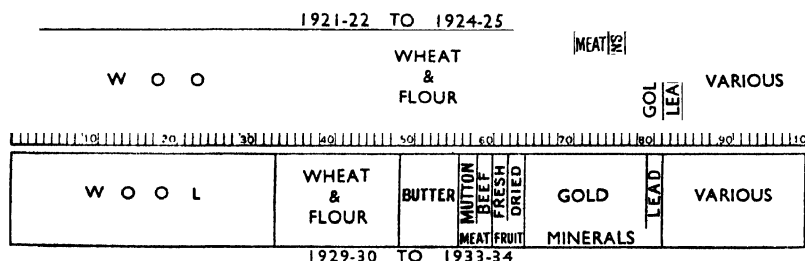


FIG. 373.—The exports of Australia.

(such as sugar) do not figure amongst the exports but are consumed at home. This is true of most manufactured goods.

Exports.—Fig. 372 shows the value of exports in recent years. The next figure shows the principal exports and their relative values. The diagram has been drawn for the average of the years 1921-22 to 1924-25, and the years 1929-30 to 1933-34. Australia

is the largest exporter of wool in the world and ranks third in wheat and wheat flour. Notice that all the leading exports are

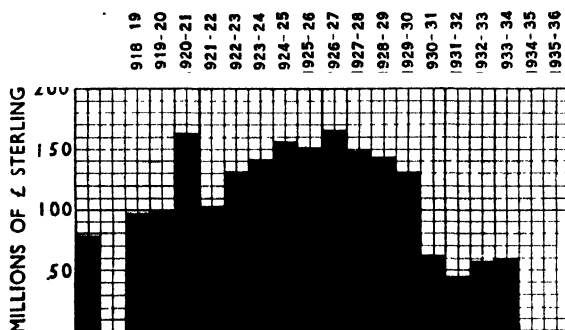


FIG. 374.—The imports of Australia (total imports, including re-exports).

(From the *Statesman's Year Book*.)

(In £ Australian, 1931-32 = £mn. 57.6 ; 1932-33 = £mn. 73.0 ; 1933-34, £mn. 76.1).

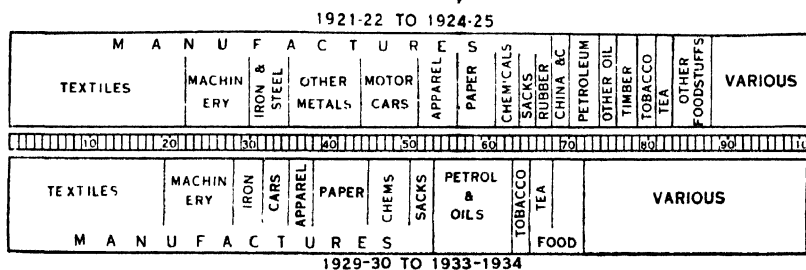


FIG. 375.—The imports of Australia.

raw materials, as Australia is still in the primary producing stage, although manufactures are developing.

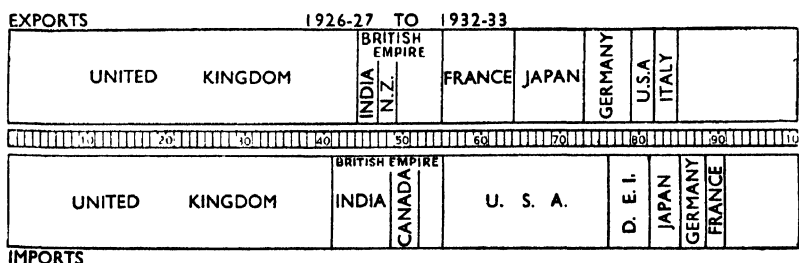


FIG. 376.—The direction of the foreign trade of the Commonwealth of Australia.

Imports.—Fig. 374 shows the movement in recent years in the value of imports. Nearly all the leading imports are manufactured goods which at present can be produced more cheaply in other

countries than in Australia. A few of the imports are foodstuffs or raw materials, such as tea and soft timber, which may be produced in Australia in the future.

Direction of Trade.—Taking the average of 1920–25, more than half the exports of Australia go to other parts of the British Empire; 44 per cent. going to the United Kingdom alone. Of foreign countries, France, Japan, United States, Belgium, Italy, and Germany have of recent years been Australia's best customers. Of the imports nearly half come from the United Kingdom, and nearly a quarter from the United States.

Ports.—A very large proportion of the foreign trade of the Commonwealth passes through the five capital cities and ports of Sydney, Melbourne, Adelaide, Brisbane, and Fremantle (Perth).

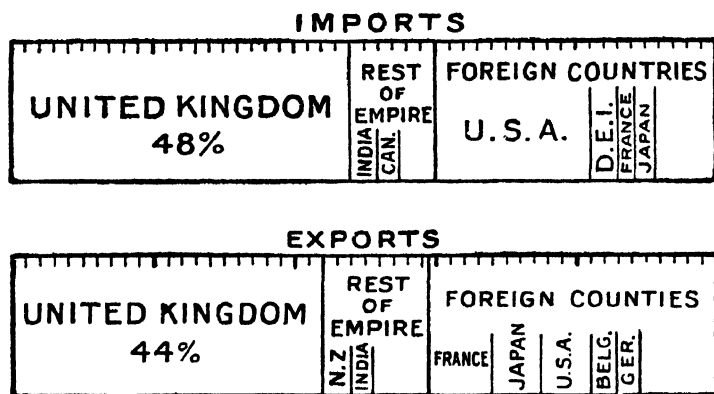


FIG. 377.—The direction of Australian trade. Average of the years 1920–25.

The average value of the imports was £139,000,000, and the exports £132,000,000.

These five have over 87 per cent. of the whole trade, Sydney alone accounting for a third of the whole. The minor ports, roughly in order of the importance of their trade, are: Newcastle, Port Pirie, Hobart, Geelong, Townsville, Launceston, Bunbury, Wallaroo, and Rockhampton. In the case of the first four the trade is over £1,000,000 annually. Darwin's trade was only £12,500 in 1932–33.

THE STATES AND NATURAL REGIONS OF AUSTRALIA

QUEENSLAND

With the exception of Tasmania, none of the states of Australia forms a complete natural region, as in each case the inland boundaries are almost entirely artificial in character.

Queensland falls quite simply into three main regions :

- (1) The Queensland Highlands.
- (2) The Great Artesian Basin.
- (3) A fragment of the Western Plateau of Australia.

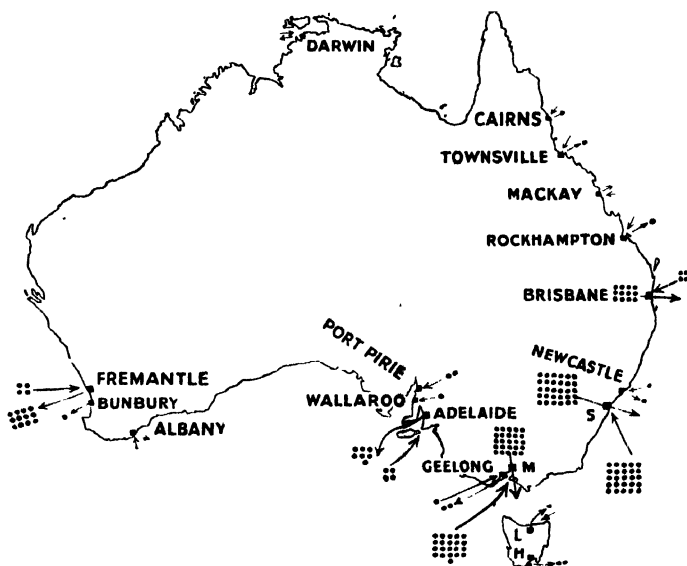


FIG. 378.—The trade of the principal ports of Australia (1932-33—a depression year).

Each dot represents approximately £1,000,000 value of goods. Notice that imports and exports are separately shown. Where no dots are shown the trade is less than £500,000.

The Queensland Highlands.—This belt of country, varying from 100 to 300 miles wide, stretches from Cape York in the north to the borders of New South Wales in the south. There is, as a rule, little coastal plain. Instead, a belt of hard granitic rocks gives rise to a series of coastal ranges, which have rendered very difficult the construction of the coastal railway line from Brisbane to Cairns. The coast is fringed with many rocky islands—the result of a sunken coastal block—and for 1,200 miles the Great Barrier Reef runs parallel to the coast. Between the reef and the shore is a shallow inland sea, well protected from the stormy waves of the Pacific. Through this sea ply steamers between Japan, China, Singapore, Java, and Australia, and a voyage in one of them enables one to appreciate the rocky nature of the coast. Southwards from the end of the Barrier Reef several large sandy islands fringe the shore, and there are larger areas of comparatively level land. Behind the coastal granite ranges are large areas of hard, old sedimentary rocks,

culminating in the Great Dividing Range. In many places the old rocks are rich in minerals, and the principal towns are either in the mining districts or have arisen as ports for them. Thus Cooktown is the outlet of the Laura Goldfield; Cairns of the Chillagoe tin and copper mines; Townsville of the Charters Towers Goldfield; and Maryborough of the Gympie mines. Rockhampton (80,000 in 1930) is particularly important, as it is situated on the Fitzroy

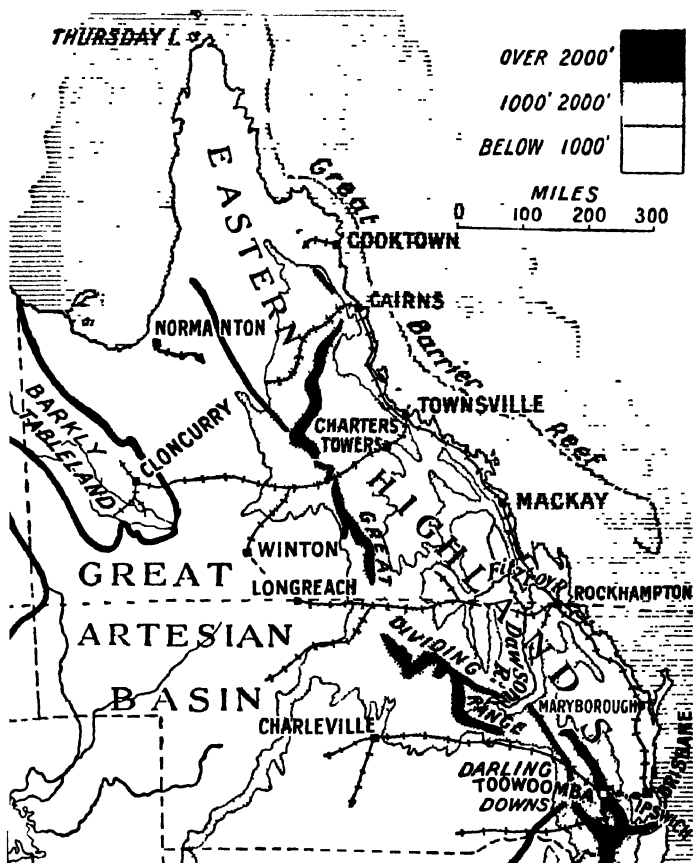


FIG. 379.—Queensland.

River, exports the copper and gold of the famous Mount Morgan gold mines, and, as it commands a most important gap in the Eastern Highlands, is the outlet for the products of the interior. Several of these ports—Cooktown, Townsville, and Rockhampton—command breaks in the ranges and are linked by rail with the interior, so that the Artesian Basin forms their hinterlands. Owing to the difficulty of communication along the eastern coast of Queensland,

and the important breaks in the ranges, a larger number of seaports have grown up than in any other state, and Queensland has so far been able to avoid the excessive concentration of population in the capital.

The greater part of this region lies in the Tropics and enjoys a good rainfall from the Trade Winds. But level agricultural land is not abundant and is found mainly in the broader river valleys. Sugar cane is an important crop, and many tropical plants can be grown. This region, for example, produces nearly all the bananas grown in Australia. Mackay is the chief sugar-manufacturing centre and port; other sugar ports are Bundaberg and Maryborough. Many of the rivers of the area reach the coast through deep gorges and over fine waterfalls (e.g. the Baron Falls near Cairns), but the larger Fitzroy River has a broader valley with fine cattle pastures and has become a centre of population. The rich but undeveloped Dawson Coalfield lies in this valley.

Brisbane (313,000 in 1930), the capital city, lies in the south on the Brisbane River, a few miles from the sea. The mouth of the river is protected by Moreton Island. Near the capital is *Ipswich* (26,000 in 1930), a manufacturing town on the most important coal field in Queensland. At the back of Brisbane, on the surface of the plateau, are the fertile Darling Downs, the chief centre of which is Toowoomba (26,000 in 1930). Thus the capital owes its importance to the fact that the Brisbane River has been made navigable by dredging, that it is the centre of the railway system and commands the produce of the Darling Downs and the Ipswich coal field.

The Great Artesian Basin.—The great Artesian Basin may be divided into two parts :

(a) The south-western, forming part of the Lake Eyre region of inland drainage, and constituting an arid region containing only a few scattered stock. Opals are found near Winton.

(b) The eastern and larger part, forming the great cattle-ranching area of Queensland. This cattle-raising region of Queensland lies between the isohyets of 10 and 20 inches, and corresponds to the savana belt. In the north, around the shores of the Gulf of Carpentaria, are low-lying areas with mangrove swamps and scrub forest, but the greater part of the region is one of rich grass with scattered trees. On the borders of the Gulf lies *Normanton*, the chief town. As already mentioned, the stock-raising districts are connected by rail through the highland gaps with the east-coast ports of Cairns, Townsville, Rockhampton, and Brisbane. The artesian water is used mainly for watering the stock. In the more temperate south sheep become important, and this part of Queensland adjoins the Wheat Belt of New South Wales.

The Western Plateau.—Near the borders of North Australia (formerly the Northern Territory) Queensland includes a portion of the ancient rocks of the Western Australian tableland. This tract is known as the Barkly Tableland, and consists of well-grassed country. On the borders of the plateau lies Cloncurry, an important copper-mining centre, connected with Townsville by rail.

An important project to link Cloncurry with Darwin by railway would place the eastern states in comparatively quick communication with India and Europe, *via* Darwin, and such a railway would

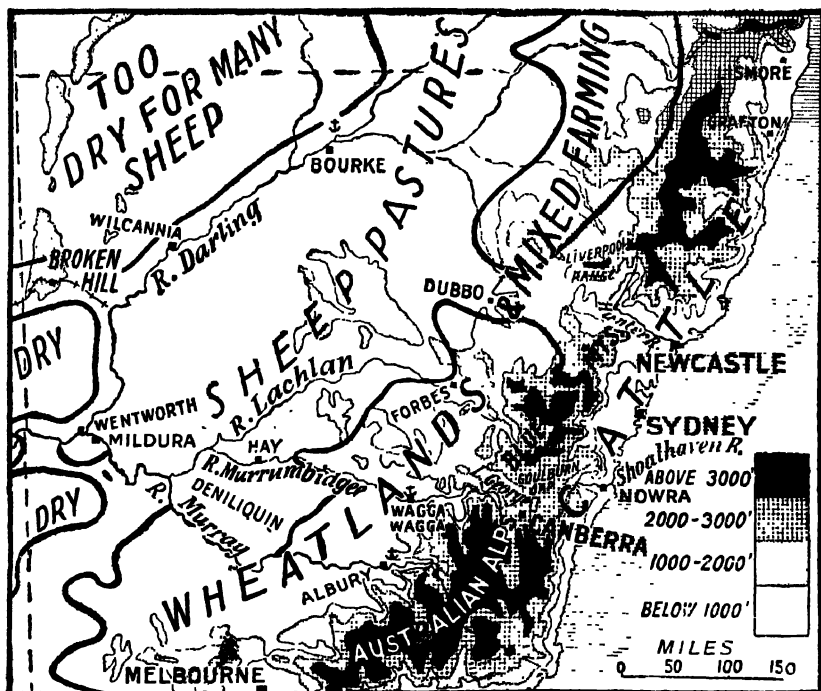


FIG. 380.—New South Wales.

also open up important areas of grassland at present practically uninhabited. There is at present a well-marked "stock route" from Western Queensland through North Australia to Darwin.

NEW SOUTH WALES

The Mother State of the Commonwealth is still in many respects the most important. It has the largest population and the largest foreign trade, the largest coal fields and by far the largest number of sheep. It can be divided into a number of natural regions which agree closely with those of Queensland :

- (1) The Eastern Highlands of New South Wales.
- (2) The Central Lowlands, comprising :
 - (a) The southern part of the Great Artesian Basin.
 - (b) The major part of the Murray-Darling Basin.
- (3) The Broken Hill Massif in the extreme west.

The Eastern Highlands.—The Eastern Highlands in New South Wales form a somewhat narrower belt than in Queensland, not as a rule exceeding 150 miles in width. They may be divided into three parts :

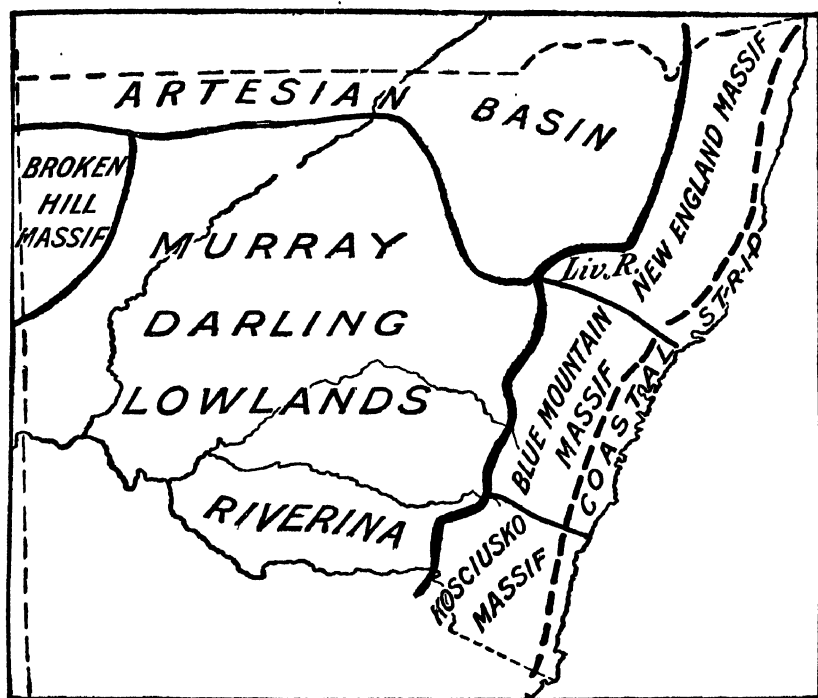


FIG. 381.—The natural regions of New South Wales.

(a) The New England Massif in the north, stretching as far south as the Liverpool Range and the Hunter Valley.

(b) The Blue Mountains Massif, stretching roughly from the Hunter Valley to the Goulburn Gap.

(c) The Kosciusko Massif, from the Goulburn Gap to the Victorian border.

The New England Massif consists of old sedimentary rocks invaded by masses of granite. The eastern slopes are rugged but are well wooded, and comprise one of the few soft-wood areas in Australia, the red cedar in particular being highly prized. The

drier western slopes are less rugged and are devoted to agriculture and sheep-rearing. The present main railway from Brisbane to Sydney runs through this district, of which Armidale is one of the main centres. The "English" character of the country is marked by flourishing deciduous trees—especially apples. Lower down the western slopes one passes into the Wheat Belt.

Between the New England Plateau and the sea is a coastal strip of varying width, watered by the "North Coast Rivers"—the Tweed, Richmond, Clarence, Macleay, and Manning. In the north sugar cane is grown, and the whole area is an important dairying region. Murwillumbah, Lismore, and Grafton, now connected with Sydney by the North Coast Line, are the main centres of this delightful country.

Special mention may be made of the broad and fertile Hunter Valley, which separates the New England and the Blue Mountain massifs, forming the important Hunter River Gap and Cassilis Gate to the interior. The valley is renowned for its fertility, though liable to serious floods. At the mouth is Newcastle (104,000 in 1930), the principal coal port of Australia, and a manufacturing centre which is greatly increasing in importance.

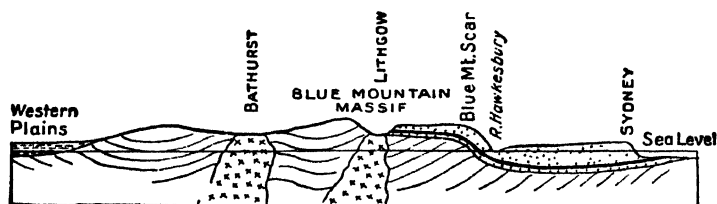


FIG. 382.—Section from west to east across the Blue Mountain Massif.

The *Blue Mountain Massif* consists essentially of a broad flat-topped plateau formed of dry massive Hawkesbury sandstone. The remarkable and sudden eastern edge of the Blue Mountains is due to a type of fold known to geologists as a monocline, illustrated in Fig. 382. Thus the coastal strip north and south of Sydney consists of exactly the same sandstone as the Blue Mountain Plateau, which is nearly 3,000 feet higher. This plateau has been dissected by a series of remarkable valleys formed by rivers, which have cut through the hard sandstone and rapidly eaten into the softer beds below and emerge on to the coastal plains through impassable gorges. On the Blue Mountains a number of pleasure resorts—Katoomba, Leura, etc.—have sprung up, and the residential suburbs of Sydney stretch northwards to the sandstone areas. Along the coast are several drowned valleys, affording excellent harbours. Of these Port Jackson (Sydney Harbour) and Broken Bay (which receives the Hawkesbury River) are the most famous. Notice that the so-called "Parramatta River" is only a short arm of the sea,

and that no river empties itself into Sydney Harbour. This is one reason why the harbour remains free from sediment. Underlying the Triassic Hawkesbury sandstone are the coal-bearing beds which yield the coals of the Newcastle and Illawarra districts. The coal seams are exposed or are near the surface along the coast south and north of Sydney, and at Lithgow on the western side of the Blue Mountains. At Sydney the coal measures lie at a depth of 2,800 feet, the whole forming "a huge black saucer, extending under the whole country from Newcastle to Lithgow in the west, and to Bulli in the south."

Sydney, the capital (899,000 inhabitants in 1921, 1,254,000 at the beginning of 1931), owes its importance to its splendid harbour, fine climate, rich hinterland, and midway position between the coal fields of Newcastle and Wollongong, as well as to political and historical associations as the capital and mother city. It contains some 40 per cent. of the inhabitants of New South Wales, and is the fifth town in the Empire in point of size. Around Parramatta a layer of clay covers the sandstone and supports a number of orchards. Further south, in the lower valley of the Shoalhaven River, is an important dairying centre. *Nowra* is the collecting centre and railhead for this tract.

On the western side of the Blue Mountains Plateau, Lithgow (15,000 in 1930) uses its coal for important manufactures, such as that of small arms. Further west are volcanic rocks associated with the old sedimentary rocks, and this drier region approaches the Wheat Belt.

The Kosciusko Massif, lying south of the Goulburn Gap and Lake George, boasts the highest mountain in Australia—Mount Kosciusko. Mount Kosciusko is a granite boss rising to 7,350 feet above sea-level, but the surrounding country, though fine, has not the essentially rugged character of fold mountains in other parts of the world. Amongst the hills of the massif lies the Federal Capital—Canberra.

Some of the heavy rainfall of the region will be caught by the Burrinjuck Dam and Hume Reservoir already mentioned. The area is at present a cattle district. There is no distinct coastal strip, but the flatter land round the river mouths affords excellent pasture for dairy cattle.

The Central Lowlands.—Although the northern part of the Central Lowlands in New South Wales forms part of the Great Artesian Basin, whilst the bulk belongs to the Murray-Darling Basin, there is little difference between the two parts. Generally speaking :

(a) The land slopes away gradually from the borders of the Eastern Highlands towards the west.

(b) The rainfall decreases from east to west, and the type of industry changes accordingly.

(c) The rivers are more constant in the south than in the north, so that more water is available for irrigation.

For the most part the lowlands are occupied by young sedimentary rocks, but near the Eastern Highlands patches of older rocks may appear from beneath the younger cover and give rise to such mining centres as those of Cobar and Wyalong.

The famous Wheat Belt forms a broad strip along the east of the region, being roughly limited on the west by the 20-inch rainfall line. Amongst the agricultural centres of this belt may be noted Dubbo, Forbes, Wagga Wagga, Albury, and Corowa.

The sheep country on the whole lies mainly to the west of the Wheat Belt, and it is in this country that great irrigation developments are taking place. It would perhaps be more correct to state that the main Sheep Belt coincides with the Wheat Belt, but that sheep thrive also both in the more hilly regions on the slopes of the Eastern Highlands and in the drier regions (with a rainfall of 10



FIG. 383.—Section across New South Wales from west to east.

inches or less) west of the Wheat Belt. Thus, towns like Bourke, Hay, Deniliquin, Wilcannia are important wool centres, but lie outside the wheat area. Wilcannia is a river port on the Darling.

Special mention may be made of the famous "Riverina," lying between the Murrumbidgee and the Murray. The eastern part is in the Wheat Belt, the western part in the pastoral belt. The soil is famed for its fertility, but its full fertility can only be developed by irrigation.

In the extreme south-west the Murray-Darling Basin is still drier, and depends entirely on irrigation for development. Wentworth is a river port lying in this area, but at present the Victorian settlement of Mildura is the most important of the irrigated tract.

Broken Hill Massif.—This mass of old rocks is a continuation of the South Australian Highlands, and lies near the western border of New South Wales. The immensely rich silver-lead deposits lying in saddle lodes have made Broken Hill famous. Great quantities of zinc are now obtained, and this metal is becoming one of the most important on the field. The mineral riches of Broken Hill have attracted a population of some 23,000 people. Owing to the factor of distance the outlet of the field is Port Pirie on Spencer Gulf in South Australia. A railway has been completed from Broken Hill to Sydney, *via* Menindee and Condobolin, but the distance is so great that it is not likely to affect the transport of ore through the South Australian port.

VICTORIA

In Victoria the main mountain divide has swung round into an east-and-west direction. At the same time the coastal strip has increased greatly in breadth and altered somewhat in character. We find that the State can be divided into four natural regions :

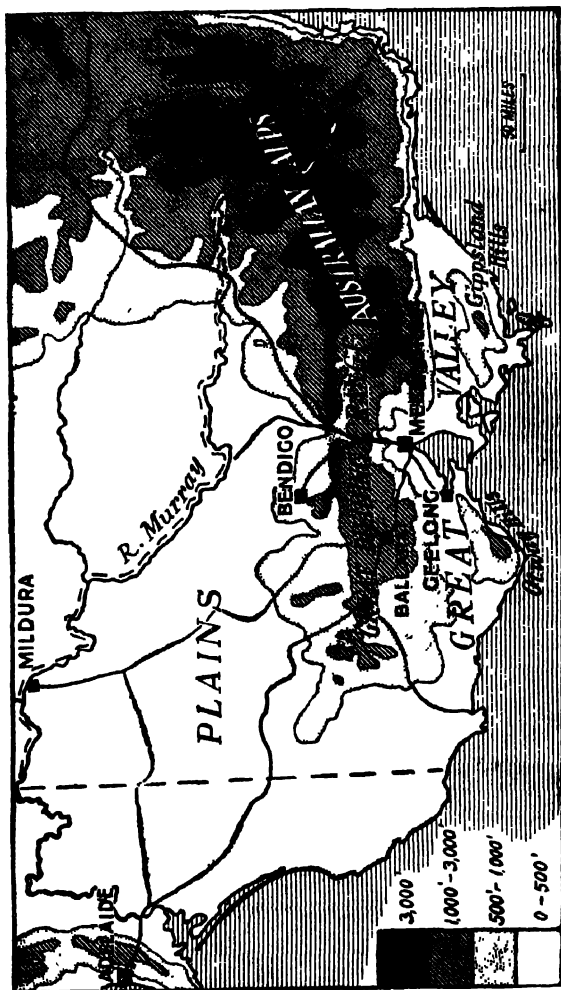


FIG. 384.—The natural regions of Victoria.

- (a) The Mallee Scrub country and Wimmera District, lying north of the Victoria Mountains and forming part of the Murray Basin.
- (b) The Victorian Highlands.
- (c) The Great Valley of Victoria.
- (d) The Otway and Gippsland Hills.

The Murray Basin.—North of the Victorian Highlands lies the continuation of the Wheat Belt of New South Wales. To the north-west lies the mallee scrub country, which, in spite of a low rainfall, is of increasing importance as a wheat area. We have already mentioned the use made for irrigation of the Goulburn and Loddon rivers, and of the Murray itself below Echuca and in the fruit-growing settlement of Mildura.

The Murray Basin is also one of the great sheep-farming regions of Victoria. Echuca, on the Murray, only 160 miles by rail from Melbourne, through the low Kilmore Gap, is one of the leading centres in this part of Victoria.

The Victorian Highlands.—Like the New England Highlands, the Victorian Highlands consist of old sedimentary rocks, penetrated by the masses of granite, and in places covered by flows of basalt (as at Ballarat). The Highlands are loftier in the east, where they are known as the "Australian Alps," and have more than a dozen peaks exceeding 5,000 feet in height. Of these Feathertop with its snowy cap (6,300 feet) is one of the best known. The Australian Alps form the feeding ground of the headwaters of the Murray and the various streams used for irrigation in the north. Amongst the Victorian Highlands lie several of the most famous of the Australian gold fields—Bendigo, Ballarat, and Castlemaine—although few of these centres now have a great production. The western part of the Highlands is lower and drier and may be described as rolling uplands well suited to wheat. An important centre is Ararat. The vine flourishes in this part, and over the whole area much land is devoted to sheep.

The Great Valley of Victoria.—To the south of the Victorian Highlands lies the Great Valley of Victoria, separated from the sea by the low Otway and Gippsland Hills. The Great Valley is divided into two halves by Port Phillip. The eastern half is a fertile dairy-farming country, studded with lakes, and known as Gippsland. Sale and Morwell are the chief centres of this part. Further west lies thickly timbered country with some of the largest hardwood eucalypts in Australia. Port Phillip is the central part of the Great Valley which has been drowned by the sea. Notice the excellent position of *Melbourne* (1,033,000 inhabitants in 1931) at the head of Port Phillip. It is the natural geographical centre of Victoria, and no other position is possible for a town to command both ends of the Great Valley as well as the country north of the Highlands through the Kilmore Gap. Most of the larger ships berth at Williamstown and Port Melbourne, but the Yarra is navigable for vessels of considerable size. Along the shores of Port Phillip Bay are numerous pleasant suburbs and pleasure resorts.

Geelong (43,000 in 1931) is an important and growing industrial centre, lying at the head of Geelong Harbour, an inlet on the west

side of Port Phillip Bay. It has a number of woollen mills, and its hinterland, the western half of the Great Valley, is part of the great Victorian sheep country. That part of the Great Valley lying around and west of Port Phillip Bay has rich volcanic soils—hence the old designation “Australia Felix.” Large areas are devoted to wheat and vegetables, but sheep largely take the place of the dairy cattle of the eastern parts of the valley. *Hamilton* is the main centre of the western part of the valley, and was long



FIG. 385.—The position of Melbourne.

Land over 1,500 feet shown in black.

famous as producing some of the finest wool in Australia. *Portland*, on the coast, is of interest as having been as early as 1834 the site of the settlement of the Hentys.

The Otway and Gippsland Hills.—These low hills attract a heavier rainfall than the Great Valley to the north, and are largely forested. Dairy-farming is increasing in importance, and there are numerous butter factories. On the Gippsland Hills the main centres are Korumburra and Alberton.

TASMANIA

Physically Tasmania is a continuation of the Eastern Highlands, and is thus comparable in some ways with a fragment of the highland regions of New South Wales or Victoria. In climate, however, Tasmania is distinct from any region on the mainland. Apart from the moderating influence on temperature exerted by the sea all round, Tasmania is further south and so cooler on the whole than any part of the mainland. Moreover, it lies entirely within the

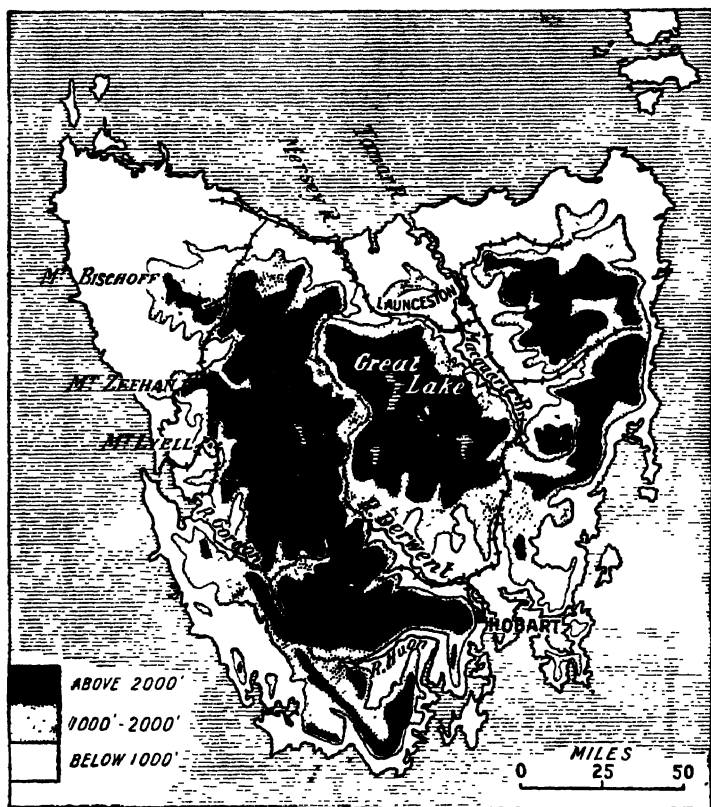


FIG. 386.—Tasmania.

Westerly Wind belt, and as a result has a good rainfall well distributed throughout the year.

Tasmania is about 200 miles from north to south, and 200 miles from east to west. Bass Strait separating it from the mainland is 150 miles wide, but is only shallow.

Geologically Tasmania resembles Victoria or the highlands of New South Wales, and consists of old, hard, sedimentary rocks

penetrated by granite masses. The latter give rise to the main mountain ranges, and with them are associated the famous mining areas of Mount Lyell, Mount Bischoff, and Mount Zeehan. The chief mountain block, with peaks rising to 5,000 feet, lies in the north-west. To the east of this lies the remarkable central plateau, nearly all over 3,000 feet above sea-level. It has been deeply dissected by the Derwent and its tributaries, and isolated portions give rise to the mountainous area of the south-west. By far the most important parts of the island are the larger river valleys and coastal lowlands lying in the eastern half.

On the whole Tasmania is higher and more rugged on the west than on the east (though the highest point, Legge's Peak, is actually on the north-east). Since the prevailing winds are westerly, there is a heavy rainfall on the west and a much lower rainfall on the east, under the rain shadow of the central plateau. Practically the whole west coast receives 50 or more inches a year, with as much as 100 inches on the west coast range behind Zeehan, but the rainfall of the eastern and central river valleys is as low as 20 inches. Ben Lomond in the north-east receives only 60 inches, in spite of a height of over 5,000 feet. As a result the western mountains are often covered with dense forests of beech and soft-wood conifers, and present an appearance curiously different from that of the remainder of Australia. This western forest country is wild in the extreme and is consequently little developed. In this region occurs the "Horizontal Scrub," which builds up a tangled mass of branches 30 or 40 feet above the ground, so impenetrable that in places the traveller can pass over the top.

Tasmania possesses important copper, silver, lead, gold, and tin mines, while fair coal is obtained at Fingal in the east and other places. Owing to rainfall and soil, Tasmania is pre-eminently an agricultural and fruit-growing country. The island is the third fruit-growing state of the Commonwealth, and shares with Victoria the leading position in the production of apples. In regard to potatoes her crop is second only to that of Victoria. Parts of Tasmania are rather too damp and cold for sheep: the average weight of a fleece is less than in other parts of Australia. But the sheep, living in a more bracing climate, are very healthy, and numbers are sent regularly to the mainland to keep up the strength and health of the flocks there.

A very important development in recent years is that of hydro-electric power installations. In particular the waters of the Great Lake, on the central plateau, are diverted into works a thousand feet lower in the Ouse Valley. The island is so small that the electric energy thus generated can be transmitted to all parts of the island. Tasmania has little coal, but the hydro-electric power available is utilized by various factories—notably large metallurgical works near

Hobart, where Risdon contains very important electrolytic zinc works. Tasmania has great possibilities in extending her water-power in manufacture and transport. Some 90,000 horse-power is now being used and much more is thought to be available.

The capital cost of water-power plant, inclusive of distribution plant, at present in operation in Tasmania is not exactly known, but is over £3,500,000, or £16 per head of population.

The population of Tasmania numbers some 221,000. Owing to the mountainous nature of the country it is densest on the narrow coastal lowlands or in the valleys of the principal rivers, especially in the less rugged east. There are, however, important population groups in the western mining areas. Owing once more to the character of the country the population is more scattered than in the mainland states.

Hobart (58,000 in 1931), the capital, is situated on the excellent natural harbour formed by the inlet of the Derwent, which makes it the port of a flourishing fruit and hop-growing district. It is also increasing in importance as a manufacturing centre. *Launceston* (31,000 in 1931), the most important town in the north, is about half the size of Hobart. It stands at the head of navigation on the Tamar, possesses a rich agricultural and pastoral hinterland, and commands most of the trade with Victoria.

SOUTH AUSTRALIA

South Australia is divided by its physical features into a number of distinct regions.

(1) The south-east lies in the lower part of the Murray Basin.

(2) The South Australian Highlands, comprising the Mount Lofty Range in the south and the higher Flinders Range in the north. Kangaroo Island is a southern continuation of the Highlands.

(3) The Great Rift Valley, which contains Spencer Gulf, St. Vincent Gulf, Yorke Peninsula, Lake Torrens, and important and fertile plains such as the Adelaide Plains.

(4) The north-east, which lies in the Lake Eyre Basin of inland drainage, and forms a part of the Great Artesian Basin.

(5) The west and north-west, which forms part of the Great Australian Plateau. In the south this region passes gradually into lower ground, in the west to the Nullarbor Plain, in the east into Eyre's Peninsula.

The chief physical features of South Australia—the younger mountains, the Great Rift Valley, and the lower course of the Murray River—run from north to south, but the older mountains of the north and the very important rainfall lines run from west to east.

Nearly all the population and agricultural development are concentrated to the south of the 10-inch rainfall line.

The Murray Basin.—The last 400 miles of the course of the Murray are in South Australia, but all the water in the river is received from New South Wales and Victoria. Although in times of drought the river may become so shallow that a man may wade across, the lower Murray is usually deep enough for continuous navigation by river steamers. In times of flood the stream overflows its banks and gives rise to shallow lagoons and billabongs.

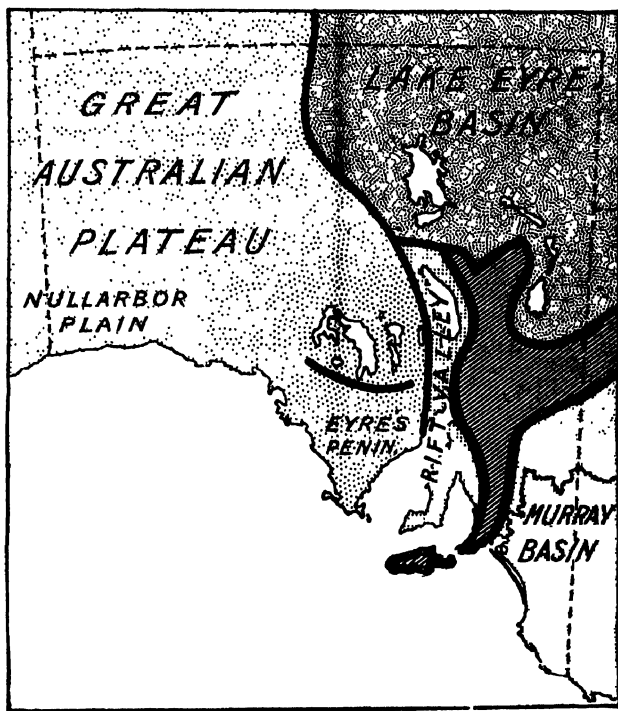


FIG. 387.—The natural regions of South Australia.

In order to regulate the flow the Lake Victoria storage scheme has been devised, and nine locks are in course of construction. The waters of the lower Murray yield large numbers of fish, especially the Murray cod, but the main use of the river is for irrigation. The flood plains are, if necessary, levelled and the water pumped up from the river. Oranges, grapes, and deciduous fruits are the principal products of the irrigated gardens. Wine is also made. The largest irrigation settlement is at Renmark, but others are rising at Moorook, Berri, Waikerie, Cobdogla, and Ral-Ral. The last named will comprise 100,000 acres. In the lower course of the

river, below the bend town of Morgan, old swamps have been drained and afford rich land for vegetable gardens and cow pastures. The river boats are fitted with cold storage for milk transport. The river steamer service has greatly declined with the coming of the more speedy railways, which have tapped the stream at Morgan, Murray Bridge, and other places. The locking scheme, however, provides for the needs of navigation. Although a sand-bar hinders access from Lake Alexandrina and the river to the ocean, it is hoped eventually to construct a canal to some harbour on the coast. The artesian water available in the basin is used mainly for watering stock.

In the extreme south-east of South Australia lies the beautiful Mount Gambier, an isolated extinct volcano. Here volcanic soils cover the limestone plains for an area of some twenty-five square miles, making a fertile pocket well suited to vegetables. The remainder of the region is important for sheep, but wheat-growing is increasing in many places. The mallee lands south of the Murray, for instance, are now producing over 2,000,000 bushels of wheat per annum. Loxton and Pinnaroo are thriving wheat centres.

The South Australian Highlands.—The Central Highlands and the rift valley of South Australia have been formed by earth movements crushing the strata against the West Australian stable massif of old rocks. The hills of the South Central Highlands, including the Mount Lofty Range, although they rarely attain a height of 2,000 feet, attract a heavier rainfall than the surrounding lowlands. There are many beautiful forested slopes, from which firewood as well as timber for mines and for sleepers is obtained. The principal trees are the red gums and the stringy barks, but pines grow well when planted. Fruits—especially the vine—flourish on the cleared hillsides with a western aspect and a rainfall of about 25 inches. South Australia possesses nearly half the vine acreage in the Commonwealth, and produces over 80 per cent. of Australia's wine, largely in this region. Olive trees are grown and olive-oil is produced. The rich soil in the valleys is planted with vegetables, and many sheep are reared. Dairy-farming and the production of butter and cheese are important. The rain-water of the highlands is impounded in a number of reservoirs. The highest peak of the Mount Lofty Range is Mount Lofty itself (2,334 feet) just to the east of Adelaide. Further north the ranges open out and the rainfall is less. Here are broad fields devoted to wheat and mixed farming. Large numbers of sheep and cattle also flourish. The famous Burra and Kapunda copper mines were in this region. Further north, commencing about Port Pirie, are the Flinders Ranges. These ranges, though of greater altitude, are drier than the Mount Lofty group of hills, but are still of sufficient altitude to attract a larger rainfall than the surrounding plains. Notice how the 10-inch

rainfall line curves northwards so as to include these hills. The gum-trees grow mainly near the streams and, though smaller than in the southern group of hills, furnish useful wood. Both wheat and stock are important. The main railway from Adelaide to Port Augusta crosses the Flinders Range by the beautiful Pichi Richi Pass. Amongst the higher peaks are St. Mary's Peak, Mount Brown and Mount Remarkable, all just over 3,000 feet. A branch of the main Flinders Range connects up with the famous Broken Hill District of New South Wales.

The Great Rift Valley.—The plains which lie along the Great Rift Valley to the west of the Central Highlands possess no general name but cover a considerable area—from Adelaide in the south to the neighbourhood of Lake Torrens in the north—and include Yorke Peninsula. The southern part of the plains, where the rainfall is more than 10 inches a year, constitutes the most important part of South Australia, and here the majority of the people live. This is the great wheat-growing region as well as the leading sheep-farming area. There are numbers of vineyards in areas of fair rainfall, especially near the Mount Lofty foothills.

Adelaide (with suburbs 324,000 in 1930), the State capital, lies in the south of this region. It was founded by Colonel Light in 1836–37, and the fine plan of the present-day city is largely the result of his forethought. The city is built on two low plateaus on either side of the River Torrens, and is divided into North and South Adelaide. The existence of the Torrens Valley makes drainage an easy matter, whilst the rainfall of the highlands supplies ample water through the reservoirs in the Mount Lofty Ranges near by. Port Adelaide was originally built on the banks of the well-sheltered Port River estuary, but the increasing size of ships has rendered necessary the construction of an outer harbour. Large manufacturing districts have grown up on the plains between the city and harbour, and many industries are carried on near the water front. *Wallaroo* is increasing in importance as a wheat and wool port, and manufactures chemical fertilisers. *Port Pirie* (10,000), the second port of the State, owes its growth to the Broken Hill mines 250 miles away. It smelts and exports silver, lead, and zinc, and imports coal (from New South Wales) and merchandise for Broken Hill, but it is also increasing as an export centre for wheat and wool. On the shore of Spencer Gulf opposite to Port Pirie is Whyalla, the port of the Iron Knob mines, whence iron ore is shipped to Newcastle in New South Wales. *Port Augusta*, at the head of Spencer Gulf, is the starting-point for the Trans-Continental Railways. It has a fine harbour, and ships wheat and wool. The other towns of the plains are mainly agricultural centres, but the salt industry of Yorketown in the Yorke Peninsula should be noted.

The shallow Lake Torrens area in the north of the Rift Valley

receives a very low rainfall. Pasturing is the only industry of importance.

The Lake Eyre Basin.—The Lake Eyre Basin of inland drainage is an arid undeveloped region. During the occasional years of good rainfall numbers of sheep could be supported, but as there is no means of escaping the inevitable years of drought and heat, the number of sheep and cattle pastured is not very great, and sheep runs formed under temporarily favourable conditions have been deserted. Much of the Lake Eyre Basin lies in the Great Artesian Region, and the artesian water is used to keep open the important stock routes. The railway to Oodnadatta runs along the southern and eastern margins of the Lake Eyre Basin, but the iron road with its fortnightly train has not resulted in any extensive settlement.

The Western Plateau.—A third of South Australia—the north-west—forms part of the arid plateau of Western Australia. The plateau region is devoid of white inhabitants, except along the southern and eastern margins, where a few cattle are raised and sheep are increasing in numbers with the sinking of bores and the construction of dog-proof fences. Opal is found in Stuart's Range. To the south-west lies the treeless limestone plain known as the Nullarbor Plain. To the south-east the plateau passes gradually into the salt-lake region round Lake Gairdner and then gives place to the low sandy hills of the Gawler Ranges, composed of ancient granitic rocks. South of the Gawler Ranges lies Eyre's Peninsula and a strip of coastal lowlands, which as far west as Fowler's Bay possess a rainfall of from 12 to 25 inches, a rainfall which is in addition, comparatively regular. With the advent of scientific farming this region is becoming a great wheat and sheep country, with Port Lincoln as the chief port. The famous Iron Knob, with its port Whyalla, lies to the north-east of the Peninsula. Eyre's Peninsula and the west coast is a region of great promise.

WESTERN AUSTRALIA

Western Australia is by far the largest of the States, and occupies a third of the whole continent. With the exception of the Northern Territory it is perhaps the least developed of the States, but the one in which immediate progress is most to be expected. About a third of this huge area lies in the Tropics; about two-thirds in the Temperate Zone.

Topographically the whole belongs to the great Western Plateau, and it is only possible to separate a narrow coastal strip down the west coast.

Geologically the plateau, as already explained, consists of a mass

of old crystalline rocks in the south, and of a complicated series of very old sedimentary rocks in the north. In the south-east the Nullarbor Plains consist of a nearly horizontal limestone covering the old rocks.

Climatologically the north-west coast has a tropical climate with a monsoonal rainfall; the south-west is a typical Mediterranean region. In both cases the rainfall decreases inland as one approaches the arid interior.

In a very broad sense Western Australia falls into three natural regions, which are defined by rainfall rather than by topography:

- (a) The Tropical Lands of the north and north-west.
- (b) The Mediterranean Regions of the south-west.
- (c) The Dry Lands of the interior.

The Tropical Lands of the North and West.—The whole area corresponds roughly with the Tropical Grasslands or Savana. Along the wetter north is a belt of savana woodland, where trees are more abundant. Practically the whole region has more than 10 inches of rainfall a year, and along the north coast it is locally more than 50 inches.

The savana and savana woodland afford good cattle country. The drowned coastline provides excellent harbours, and the recent establishment of meat-chilling works at Wyndham marks an important step in development. Other outlets of the country are the small ports of Derby (on the Fitzroy River) and Broome. The position of artesian basins awaiting development should be noted.

The Mediterranean Region ("Swanland").—Along the west coast is a coastal strip enjoying a good winter rainfall. This falls into two parts:

- (1) The Perth Region, which consists of recent sands and limestones and has an underlying artesian basin giving a good water supply. The natural vegetation is Tuart Forest, but amongst the sandhills are numerous swamps. These, when drained, afford excellent agricultural land—especially for vegetables—and magnificent dairy pastures. Towards the scarp of the plateau the fertile soils are excellent for the growth of vineyards, and considerable quantities of wine are produced. A more recent development is citrus-fruit farming.

Perth (205,000 in 1931), the capital of Western Australia, lies in this region, beautifully situated on the broad shallow Swan River. At the mouth of the river lies *Fremanle* the chief port. *Bunbury*, at the southern end of the region, is a small port for timber and other produce.

- (2) The Greenough Region, to the north of the Perth Region, has a rainfall of 15–20 inches, and is therefore suited to wheat. *Geraldton* is the port of this region.

On the plateau itself in the Mediterranean climatic belt lie two regions :

(3) The Jarrah Region, with a rainfall of more than 25 inches, is so called because it is the home of the jarrah forests. In the wettest parts of the south-west are the fine karri forests (rainfall 40 inches). Much of the country is suited to fruit orchards and dairy-farming. The region is bounded on the west by the Darling Fault scarp. *Albany*, occupying a fine position on King George Sound, lies to the south-east of the region, but also serves the Wheat Belt.

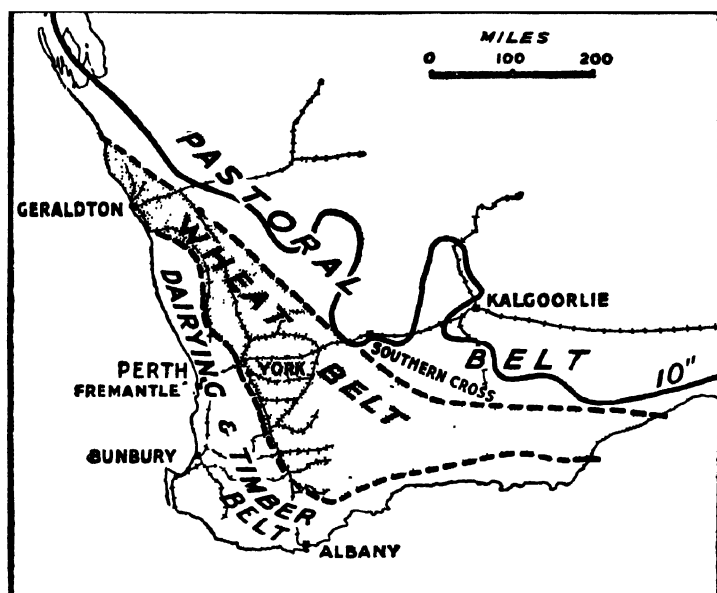


FIG. 388.—Swanland.

(4) The Wheat Belt occupies a strip of the plateau having a rainfall of between 10 and 25 inches. The growing of wheat has spread rapidly in recent years, and is capable of much greater development. The belt is well served by railways. *York* is an important centre. To the east, where the country is a little dry for wheat, sheep-farming is the leading occupation, but wheat is gradually pushing into the pastoral belt, as at Southern Cross.

The Dry Interior.—The Kalgoorlie Region, rendered famous by the gold fields of Kalgoorlie, is marked off from the wheat belt merely by decrease in rainfall. *Kalgoorlie* (5,000 in 1925) has now another importance as a railway junction, with a break of gauge.

The Nullarbor Plain, of horizontal Tertiary limestone, is covered

with salt-bush and blue-bush, and almost entirely undeveloped. The artesian basin unfortunately yields brackish water.

To the north of Kalgoorlie, the rainfall is very low and the natural vegetation is mulga scrub. This fades gradually into the heart of Western Australia, which may be described as a sandy desert. It consists mainly of rolling sandhills sparsely clothed with spinifex. The region is often known as the "Sandridge Desert." To the east on the borders of South Australia come the Central Highlands, where watercourses exist, and where grassland may make pastoral development possible. This highland belt is better marked in the southern part of Central Australia and in northern South Australia, where there are the Musgrave and Macdonnell Ranges.

The arid lands of the interior extend to the central part of the west coast, where the Carnarvon Region has a rainfall of less than 10 inches. The presence of the North-West Artesian Basin may make pastoral development possible. In this region lies Sharks Bay, famous for its pearl fisheries.

THE NORTHERN TERRITORY

The administration of the Northern Territory was handed over to the Commonwealth Government in 1911. Towards the end of 1926 the Federal Parliament passed an Act providing for the division of the old "Northern Territory" into two States—North Australia and Central Australia, but this Act was repealed in 1931.

The population of the whole enormous area of over half a million square miles is under 5,000, including nearly 1,500 Asiatics and half-castes.

Owing to difficulties of climate and communication there has been little progress in development for the last thirty years. During the Great War the establishment of meat works at Darwin gave a temporary impetus to that port, but Darwin is not well situated in relation to the broad belt of tropical grassland which occurs some distance further south.

Although much of the soil in North Australia is poor and sandy, the rainfall in the northern part is adequate and the land capable of extensive development if capital and labour were available. Whether agriculture is possible without the help of coloured labour is another matter. At present the main industries are cattle-raising, mining, and pearl-shell fishing, and there are considerable prospects for the future in the first two. The whole north, however, is waiting for a comprehensive scheme of development. A railway has been built from Darwin to Birdum near Daly Waters, and much is expected from its extension to meet the railways of Southern and Eastern Australia at Stuart (formerly Alice Springs) and Cloncurry.

In the heart of central Australia—right in the centre of the continent—lies a tract of land rising above the general level of the plateau (the Macdonnell and Musgrave Ranges, and the Burt Plain). This is said to be good pastoral country with a rainfall of about 10 inches. Stuart, formerly called Alice Springs, has recently been linked with Oodnadatta by railway.

NEW ZEALAND

Position and Size.-- The Dominion of New Zealand consists of two large and several small islands in the South Pacific Ocean. They may be grouped as follows:

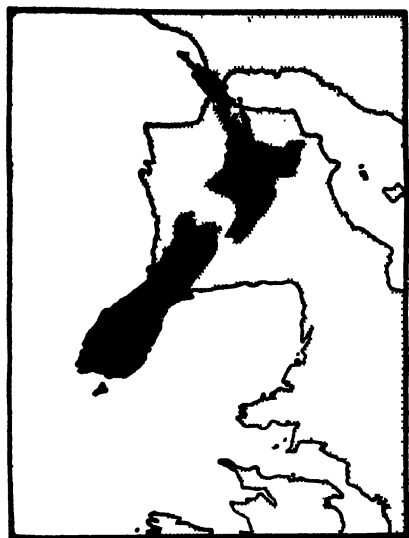


FIG. 389.-- Sketch-map showing the position of New Zealand compared with land on the opposite side of the globe.

(a) Islands forming the Dominion proper, over which British sovereignty was proclaimed in January, 1840—North Island, South Island, and Chatham Islands. There are numbers of islets near the coast of each, and the larger Stewart Island to the south of South Island.

(b) Outlying islands, added to the area of New Zealand by the limits proclaimed for the colony in 1847—Antipodes Islands, Auckland Islands, etc.

(c) Islands annexed at later dates—Kermadec Islands (1887), Cook Islands (1901), Niue Island.

A large sector of Antarctica, the Ross Dependency, is also attached to New Zealand. Under mandate from the League of Nations, New Zealand now administers the former German possession of Western Samoa and, jointly with Australia, the island of Nauru. The area of New Zealand proper is 103,285 square miles.

Physical Features.— The mountainous character of New Zealand is one of its most striking features. The main mountain backbone is higher and broader in the South Island than in the North Island. In the South Island the mountains, known as the Southern Alps, have no less than sixteen peaks over 10,000 feet, including Mount Cook (12,349) and Mount Tasman (11,475). The higher mountains are snow covered throughout the year, and there

are many beautiful glaciers. The Franz Josef Glacier descends to within 700 feet of sea-level. The Southern Alps lie much nearer the west coast than the east; in the south-west the mountains approach the coast, and there is a stretch of magnificent fiord country:

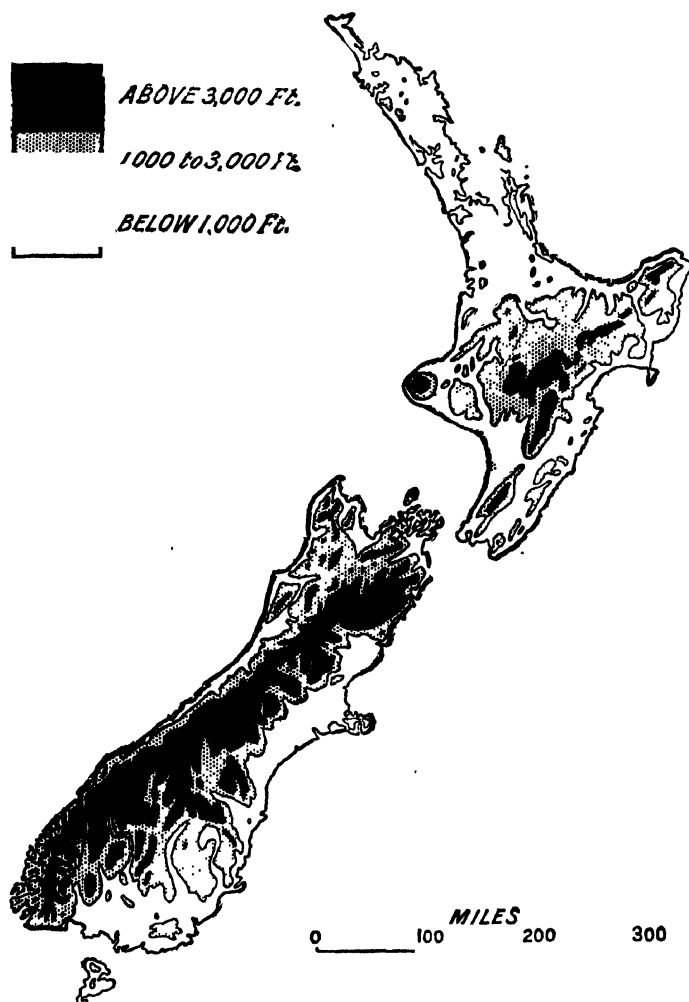


FIG. 390.—Physical map of New Zealand.

further north the narrow coastal plain of Westland separates the mountains from the sea.

In the North Island, the main chain does not exceed 6,000 feet in height, and lies nearer the east coast. West of the main chain, three magnificent volcanoes tower to greater height, and a fourth,

Mount Egmont, stands by itself in the south-west of the North Island and rises to 8,260 feet.

On the basis of its physical features New Zealand may be divided into a number of broad physiographic regions :

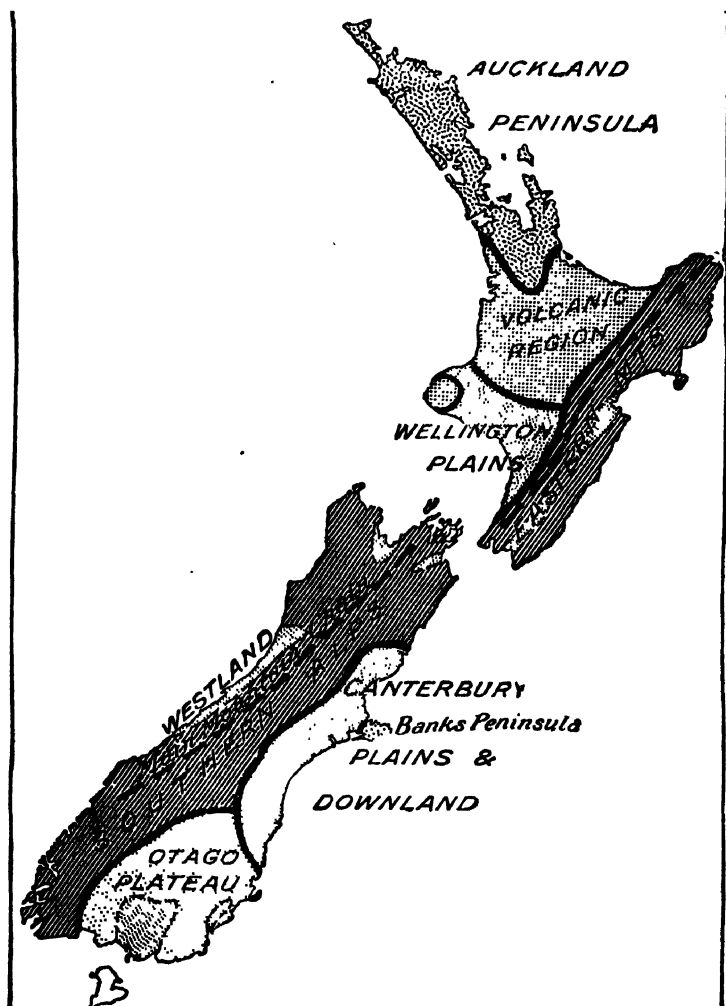


FIG. 391.—The main physical regions of New Zealand.

The more important plains which lie amongst the mountain or plateau lands are separately shown.

NORTH ISLAND.

(a) *The Eastern Mountain Ranges.*—There is not one single range, but a series, and foothills occur all along the east coast except where interrupted by the broad Hawke's Bay.

(b) *The Volcanic Region*.—This surrounds Lake Taupo and stretches northwards to the Bay of Plenty. To the south this region merges into the fertile

(c) *Wellington Plains*.

(d) *The Auckland Peninsula*.—This area occupies the north of the island, and is mainly lowland.

SOUTH ISLAND.

(a) *The Southern Alps*.—With their foothills and subsidiary ranges, these mountains occupy well over half the island. The main range of the Southern Alps stops abruptly at Cook Strait, and is not continued into the North Island. It is a subsidiary eastern range to the Southern Alps which crosses the strait.

(b) *The Otago Plateau*.—This large dissected plateau of ancient rocks occupies the south of the island.

(c) *The Canterbury Plains and Downland*.—The Canterbury Plains form a well-marked lowland region, 150 miles from north to south along the coast. With the plains may be included the hilly Banks Peninsula, largely of volcanic origin. Surrounding the plains and separating them from the Southern Alps are large stretches of undulating country or “downland.”

The rivers of New Zealand, especially in the mountainous South Island, are swift streams more suitable for the generation of power than for navigation. In the South Island, the longer ones naturally flow to the east coast. In the North Island the Waikato and certain others are navigable by small steamers but, like the Australian rivers, have sand-blocked mouths. Recent subsidence in the north of the island has resulted in the drowning of the river mouths, some of which afford excellent harbours.

Geology.—Geologically the Dominion of New Zealand resembles England in containing small “samples” of rocks of most of the geological ages. Physical features depend to a marked degree on geological structure. In the South Island the Southern Alps consist of highly folded rocks of varying age; the fiord country and Otago Plateau of ancient metamorphic rocks; the downland and low hills mainly of beds of soft sandstone and limestone; the larger plains, notably the Canterbury Plains, are of comparatively recent formation and consist of sheets of gravel—in some cases largely of glacial origin. In the North Island, the mountain ranges of old folded rocks are of more limited extent. Remnants of other fold ranges occur in North Auckland and the gold-bearing country of the Colville Peninsula. The dominant feature of the North Island is the volcanic country in the heart of the island and stretching northwards to the Bay of Plenty. Much of the surface is covered with pumice and is largely barren. East of the main fold ranges

are younger rocks, and there are numerous though small gravel plains. Sand dunes cover large areas near the west coast, especially in North Auckland.

Minerals.—Although small quantities of many minerals occur

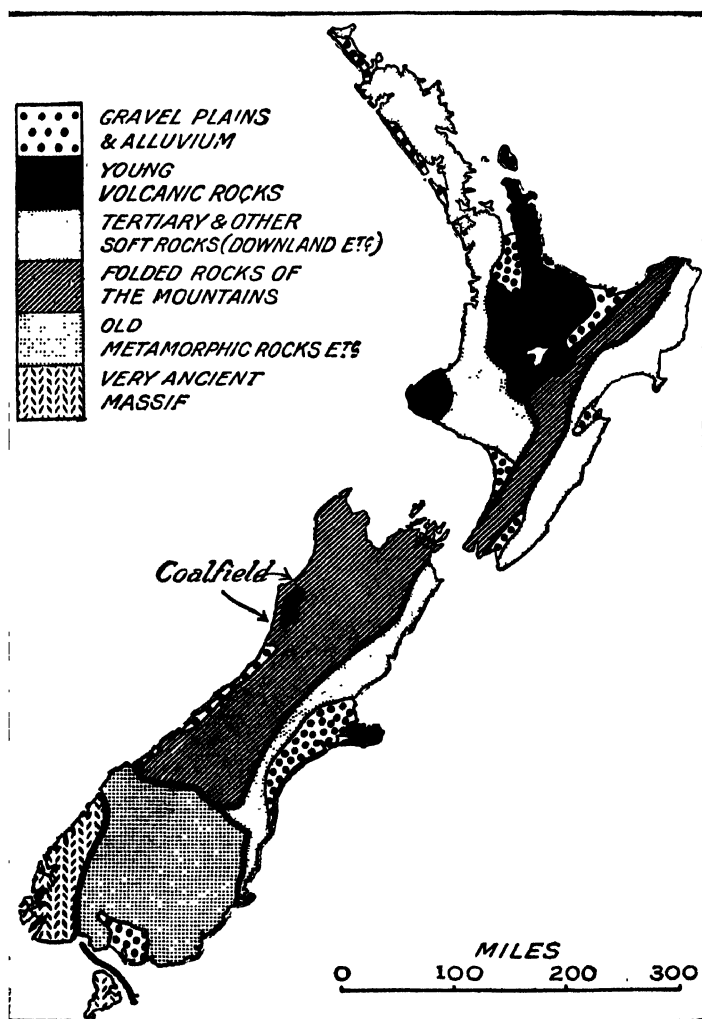


FIG. 392.—Simplified geological map of New Zealand.

widely scattered in New Zealand, only two or three are of commercial importance.

Gold.—As in Australia, the discovery of gold in New Zealand contributed greatly to the progress and settlement of the country, but the production, after declining for a number of years, has recently

risen. From 1853 to the end of 1932, gold to the value of £95,000,000 was obtained. In 1929 the output was only £480,000, but in 1932 was £1,092,000. The production is mainly from lodes, as in the Cape Colville Peninsula, and from dredging operations in the beds of deep streams. Most of the gold from the quartz lodes contains a proportion of *silver*.

Coal.—New Zealand has several small fields of bituminous coal, notably around Greymouth and Westport on the west coast, and some extensive fields of lignite. The present output of about 2,500,000 tons is a little more than enough for home consumption.

Iron Ore.—Extensive deposits of iron ore occur in Nelson Province and elsewhere, and a start has been made with smelting at Onakaka.

Kauri-gum.—The fossil gum is dug from the soils of former kauri forests in Auckland Province. To the end of 1924 the total value of the gum exported was £21,000,000. In 1927 4,674 tons were exported, worth £280,000; in 1933, 2,070 tons (£62,000).

Among other minerals may be mentioned New Zealand jade, phosphates, and sulphur.

Water-power.—With a mountainous surface and a good and regular rainfall, and many rivers naturally regulated by lakes, New Zealand has exceptional resources of water power. It is estimated that 775,000 H.P. could be easily developed in the

North Island, and over 4,000,000 H.P. in the South Island. At present about 70,000–80,000 H.P. is actually developed. The Lake Coleridge works supply Christchurch and Lyttelton; the Waikato River is used to supply Cambridge, Hamilton and district; and the Mangahoe Power Scheme supplies Wellington and a large area.

Climate.—Generally speaking, New Zealand has a mild and equable climate of the Cool Temperate Oceanic or North-West European type. See the graphs and figures for Dunedin, which may be considered typical of the colder parts, on pp. 63–4. The northern part of the North Island lies in the same latitudes as Mediterranean lands. It is too much influenced by the sea to have a typical Mediterranean climate, but there is a marked winter rainfall maximum, and a temperature ranging from 50° to 70°. Since the prevailing winds throughout New Zealand are from the west, the east is always the drier side—as shown in Figs. 393 and 394. The climate of the drier eastern coasts is more continental in character; at Christchurch the range of temperature is 20°;

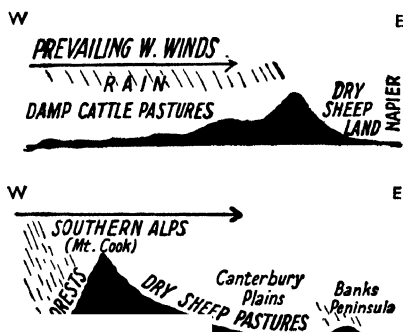


FIG. 393.—Sections across the North Island and South Island of New Zealand.

frosts may occur for nine months, but summer temperatures of 90° are common. In most regions the climate is bright and sunny, and such situations as the shores of Tasman's Gulf enjoy a particularly sheltered and pleasant climate.

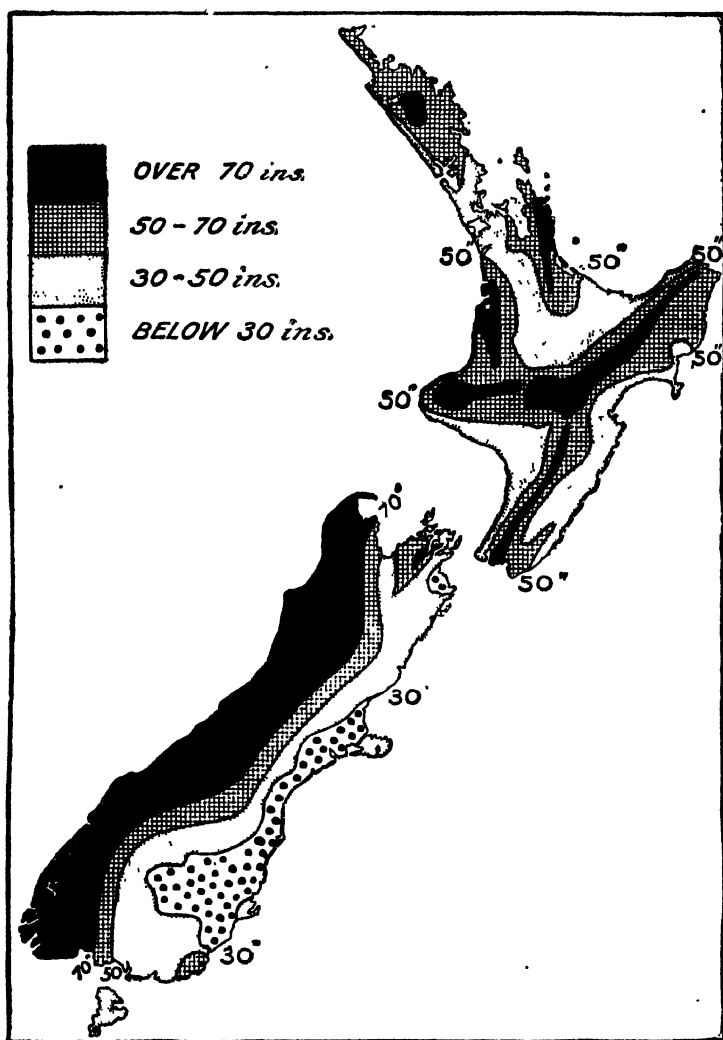


FIG. 394.—Rainfall map of New Zealand.

Notice that no part of the Dominion is really dry. Contrast Australia.

Natural Vegetation.—New Zealand has a rich and varied vegetation. Temperate Forests, evergreen in the wetter regions and almost sub-tropical in character, form the typical vegetation of lowlands and lower slopes of the mountains. It is in these forests

that are found the numerous ferns and tree ferns which have made the forest scenery of New Zealand world famous for its beauty. Mountain forests, consisting largely of the southern beech, may extend also to the lowlands. Grassland with tussocks of grass is common on the volcanic plateau of the North Island, and on the eastern plains of the South Island.

Forests.—Nearly a fifth of New Zealand is forested, and of this 5,500,000 acres may be described as forest land with marketable timber. There is now very little of the famous kauri left; the principal softwoods are now rimu and kahikatea. New Zealand is fortunate in having also hardwoods and there are large reserves of beech.

Agriculture.—A fifth of New Zealand is forested; two-thirds is suitable for agriculture and grazing. Out of a total area of 66,400,000 acres; 19,500,000 acres are under "cultivation" but no less than 16,600,000 acres of this are "sown grasses." The area under grain and pulse crops (excluding crops grown for hay) is less than 500,000 acres. It will be seen at once that New Zealand is a pastoral rather than an agricultural country. Excluding hay, fodder, and turnips, wheat and oats are the only crops covering more than 100,000 acres. Wheat is grown in the Canterbury Plains, oats in the Canterbury Plains, Otago, and the North Island. *Phormium tenax*, or New Zealand flax, a fibre largely used for rope-making, etc., is obtained from a plant growing wild in damp places, but also planted artificially, especially in Wellington Province. About 25,000 acres are occupied by *orchards*, especially in North Auckland, Nelson, Otago, Canterbury, and Hawke's Bay, and there is considerable export of apples. The vine will only grow in the warmer regions of the North Island. The large area under sown grasses is due to the fact that English grasses thrive, and afford better food for sheep and cattle than the native grasses.

Pastoral Industries.—The following table shows the number of animals in New Zealand in 1934 :

Horses	274,000
Cattle	4,301,000
Sheep	28,650,000
Pigs	660,000

Horses.—Though still widely used for draught purposes and farm work, it is interesting to note the decline in the number of horses since 1911, largely owing to the increased use of motor-cars and mechanical farm implements.

Cattle.—Formerly principal attention was paid to the rearing of cattle for beef and the development of the beef export trade. The average number of cattle killed for meat during the years 1928-34 was 370,000 per year, yielding 2,300,000 cwt. of meat, of which 750,000 cwt. were exported. Of recent years it is the rise

of the dairy-farming industry which has been mainly responsible for the increase in the number of cattle. There is now a marked tendency amongst farmers to keep fewer but better cows, and to grow special fodder crops, so as to induce the cows to give more and better milk. Milking machines are widely used in New Zealand, and have effected a great saving in wages for the farmer. Amongst the New Zealand cattle are found all the best breeds of England, but the most numerous are cross-breeds in which the predominating strain is the famous Jersey breed. Under the Dairy Industry Act, 1908, the quality of dairy produce is carefully watched by inspectors appointed by the Government, with the result that New

Zealand butter and cheese have acquired a high reputation in Europe. Fig. 395 shows the distribution of cattle in New Zealand. More than 80 per cent. of the whole are found in the moist, fertile lands of the North Island. Auckland specializes in the production of butter; Taranaki and Wellington in cheese.

Sheep.—A graph illustrating the rise of the principal pastoral industry in New Zealand has already been given on p. 218 (Fig. 171). There are now about 29,000,000 sheep in the country. Owing to the varied nature of the surface, there are many different breeds, each requiring different conditions. Some regions specialize, as in Australia, in producing

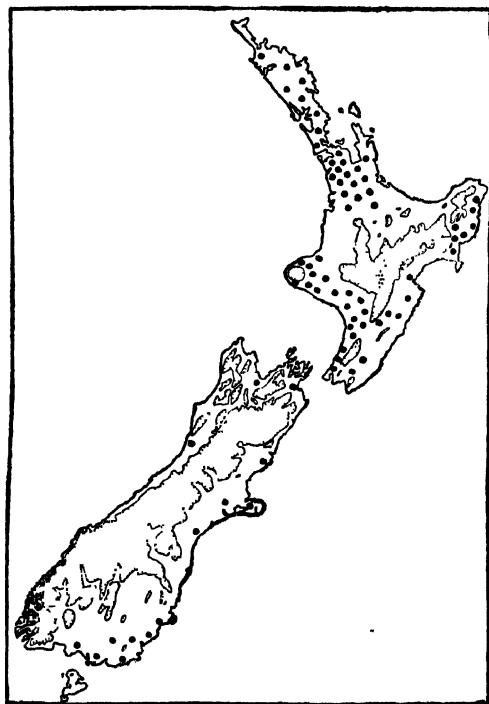


FIG. 395.—The distribution of cattle.

Each dot represents 50,000 cattle in 1925. All land above 2,000 feet shaded. The cattle are all on the lowlands.

fine quality wool; other regions in mutton and lamb for export. On the hills and downs of the South Island the merino sheep (famous for its wool) flourishes; on the Canterbury Plains the famous Corriedale breed of sheep (a cross between a merino and one of the English breeds, Leicester or Lincoln) produces the "Canterbury Lamb," now so well known in England, as well as excellent wool. In the moister North Island the Romney sheep, which comes from

the wet Romney Marsh of England, is the favourite sheep. The Southdown sheep produces much of the fat lamb of both islands.

Pigs.—Although there are large numbers of pigs in New Zealand, the pig-breeding industry has not progressed in the same way as the sheep-farming and cattle-farming industries. There are 4,000,000 poultry in New Zealand (1926 census). The dairying lands of the Dominion are well suited to bee-keeping, and honey of excellent quality is produced. About 1,100,000 lbs. of honey are exported annually (1928 1934).

Fisheries.—The rich fisheries round the islands are as yet little exploited. The once-important whale fisheries are now of slight significance.

Population.—The colonization of New Zealand really dates from the foundation of Wellington in 1840. The gold rushes of the 'sixties brought large numbers of people to New Zealand, and since then there has been a steady increase both by immigration and by natural increase to 1,548,900 in 1934. The native Maoris numbered 68,200 in 1931.

Manufactures.—The population of New Zealand is not yet sufficient to permit the development of a wide range of manufacturing activities, and at present the manufactures are mainly connected with the preparation of raw materials produced in the Dominion. The principal industries are thus meat-freezing and preserving; butter, cheese, and condensed milk making; grain milling, clothing manufacturing, and woollen-milling, saw-milling, brewing, and tanning. Steam as a motive power is being rapidly replaced by electricity.

Communications.—The railways of New Zealand are nearly all state owned, and are on the 3' 6" gauge. As shown in Fig. 397



FIG. 396.—The distribution of sheep in New Zealand.

Each dot represents 100,000 sheep in 1925. The line shown is the 50-inch rainfall line. Notice that nearly all the sheep are found where the rainfall is less than 50 inches per year.

the direction of the railways has been controlled to a marked degree by physical features. The isolation of such centres as Gisborne, Nelson, and Blenheim should be noted, and it will be gathered that coastal steamer services play a large part in the communication system. Great progress has been made in the

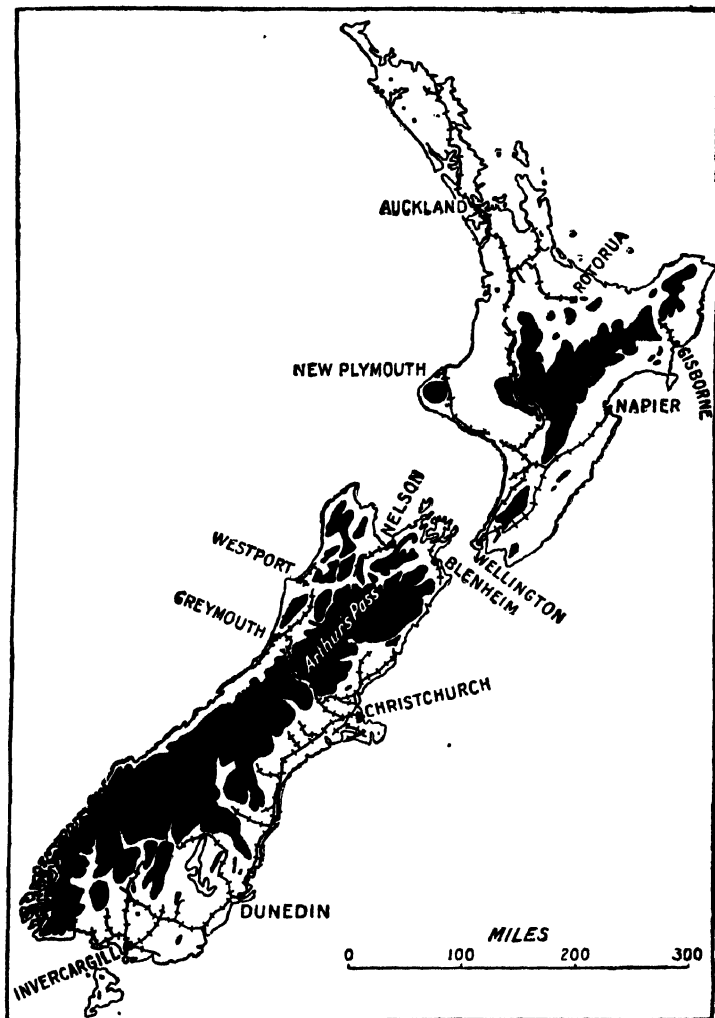


FIG. 397.—The railways of New Zealand.

All land over 2,000 feet in black. Only two railways cross this high land.

improvement of roads in New Zealand since the introduction of motor-cars (of which there are over 100,000 in the country). Roads link up places like Gisborne, not yet served by rail, and Napier.

Despite its world-isolation, New Zealand is becoming an

important tourist centre. The variety and accessibility of its scenic attractions and its thermal waters are mainly responsible.

Foreign Trade.—New Zealand enjoys the distinction of having a larger foreign trade per head of population than any other country in the world.

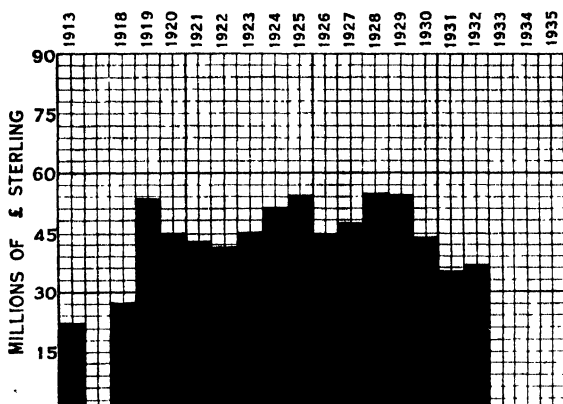


FIG. 398.—The exports of New Zealand (exports of domestic produce—total exports are about £1,000,000 more).
(£N.Z. after 1930. £ sterling would be 5–10 per cent. less.)
(1933, £mn. 41; 1931, £mn. 47·3; 1935, £mn. 46·5.)

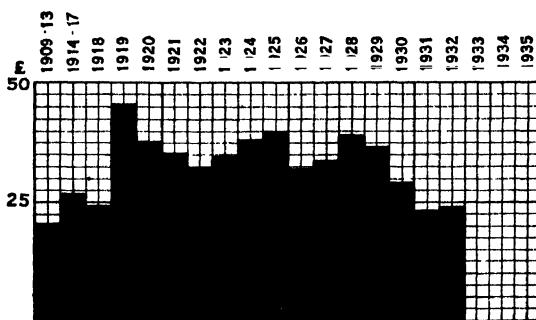


FIG. 399.—The exports of New Zealand—per capita value.

Exports.—The growth of the export trade of New Zealand is shown by the following figures :

1900	. .	£13,000,000	or £16	5s. (\$79·1)	per head of population
1910	. .	£22,000,000	„ £21	0s. (\$102·3)	„ „
1920	. .	£45,500,000	„ £36	15s. (\$180·0)	„ „
1924	. .	£52,000,000	„ £38	10s. (\$187·5)	„ „
1925	. .	£54,500,000	„ £39	10s. (\$192·4)	„ „
1932	. .	£36,900,000			
1935	. .	£46,500,000	„ £30	10s.	„ „

It must be remembered that the enormous rise from 1910 to 1924 is in part due to increase in prices. Exports in 1924 were worth £24,000,000 or £17 15s. (\$86·4) per head, calculated at 1900 prices. Fig. 398 shows the value of exports in recent years, Fig. 399

shows the rise expressed in terms of *per capita* value. The next diagram shows the leading items in the export trade. It will be seen that the wealth of New Zealand depends almost entirely on her dairying and sheep-farming industries. In 1926 the proportions by value were: wool, 26·1 per cent.; butter, 19·2 per cent.; meat, 19·1 per cent.; cheese, 13·1 per cent. Other items, in order of importance, are sheep-skins, 3·4 per cent.; hides, 1·8 per cent.; tallow, 1·6 per cent.

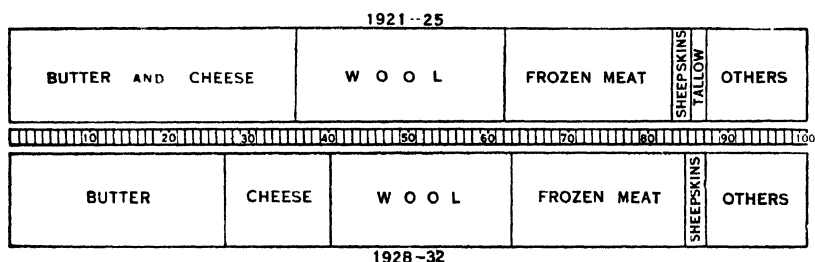


FIG. 400.—The exports of New Zealand.

The diagram stresses the dependence of New Zealand's prosperity on sheep and dairy farming.

cent.; rabbit skins, 1·8 per cent.; all connected with the pastoral industries. Gold represented in 1926, 1·1 per cent.; timber, 1·1 per cent.; phormium fibre, 1·3 per cent.

Imports.—In normal years the value of imports is considerably less than that of exports:

1910	. .	£17,000,000 or £16 7s. 9d. (\$79·8)	per head of population
1921	. .	£43,000,000 „ £33 12s. 9d. (\$163·8)	„ „
1924	. .	£48,500,000 „ £35 17s. 6d. (\$174·7)	„ „
1925	. .	£52,500,000 „ £37 17s. 10d. (\$184·5)	„ „
1932	. .	£23,000,000	
1935		£36,300,000	

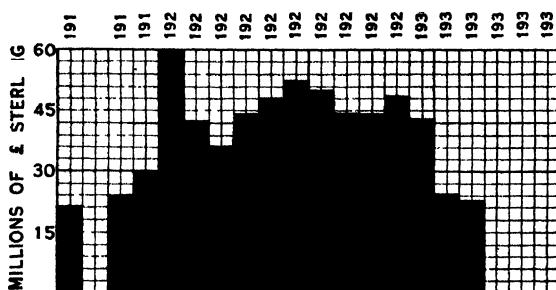


FIG. 401.—The imports of New Zealand.

(£N.Z. after 1930; 1933, £mn. 25·6; 1934, 31·3; 1935, 36·3.)

Fig. 401 shows the value of imports in recent years, Fig. 402 the imports expressed in *per capita* value. As shown in Fig. 403, the imports are far more varied than the exports, but manufactured goods easily predominate. In the diagram iron and steel manufactures include motor-cars (10·4 per cent. in 1926);

machinery (7·5 per cent.) ; iron and steel (4·8 per cent.) ; implements (1·4 per cent.) ; and hardware (2·3 per cent.). Among other

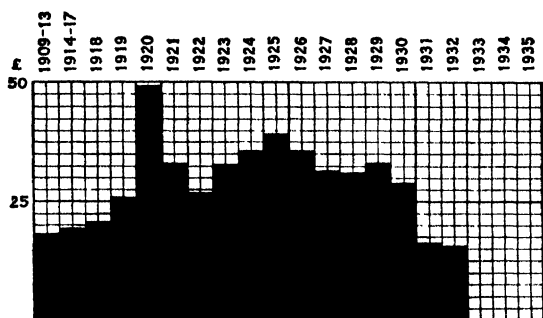


FIG. 402.—The imports of New Zealand—*per capita* value.

imports shown roughly in the diagram may be noted, in order of value in 1926, drugs (2·3 per cent.) ; boots and shoes (2·0 per cent.) ; timber (1·7 per cent.) ; tobacco (0·3 per cent.).

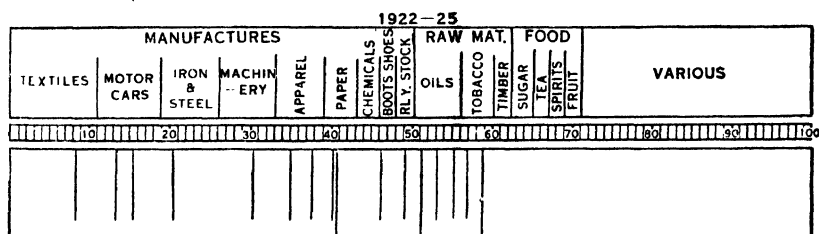


FIG. 403.—The imports of New Zealand.

(The lower half of the diagram represents the years 1928-32, the items being in the same order.)

Direction of Trade.—Taking the average of the years 1921-25, about 80 per cent. of the exports went to the United Kingdom ; and more than 50 per cent. of the imports were received therefrom.

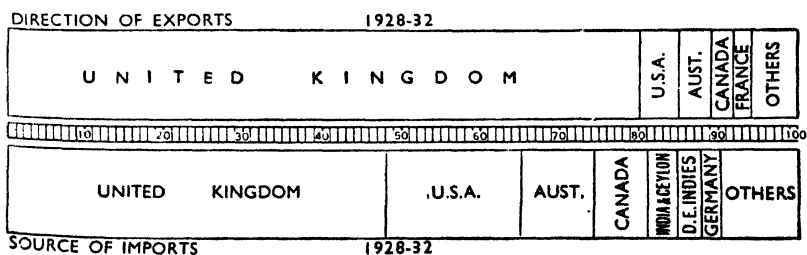


FIG. 404.—Direction of New Zealand's foreign trade, 1928-32.

The United States took about 7 per cent. of the exports and supplied 15 per cent. of the imports ; Australia took 7 per cent. of the exports and supplied about 13 per cent. of the imports. The diagram shows the position for the years 1928-1932. The

remarkably close trade connections between New Zealand and the Mother Country is particularly noteworthy. Over 90 per cent. of the traffic is carried in British ships.

Ports.—The leading ports of New Zealand are Auckland and Wellington, close rivals in the import trade, and receiving over 60 per cent. of the whole. Other importing centres in order are : Lyttelton, Dunedin, Invercargill, and Napier. The export trade is more evenly distributed, though more than 50 per cent. is handled by Wellington and Auckland. The others in order are : Lyttelton, Napier, Dunedin, Invercargill, Wanganui, Timaru, Gisborne, and New Plymouth.

The Natural Regions of New Zealand.—The division of New Zealand into provinces was largely the result of the early days when separate parliaments governed in their own little spheres. A region clearly marked off by nature became a distinct unit politically. There is, therefore, a fairly close correlation in New Zealand between the natural regions and the old provinces. In many cases the divisions between provinces were also the divisions between natural regions, but provincial divisions are no longer used officially.

THE NORTH ISLAND

North Auckland, including the Auckland Peninsula.—The province of Auckland was the largest and most northerly in New Zealand, and covers nearly a quarter of the whole of the Dominion. It corresponds roughly with the climatic region which has a modified Mediterranean type of climate with a winter rainfall maximum. The northern warmer region corresponds roughly with the Auckland Peninsula, but includes also a very important tract of lowland south of the city of Auckland.

North Auckland is the home of the giant kauri, one of the finest timbers in the world, and once highly esteemed by reason of the magnificent masts for sailing ships which it made. The kauri exudes a clear gummy fluid, which hardens as it dries and drops off the trees into the soil. "Kauri-gum" is thus obtained by digging not only in the soil of the existing forests but in many regions where the kauri formerly existed. It is also possible to obtain supplies by regular tapping of growing trees. Its value lies in its use in varnish making. Although large areas of kauri forest are now rare, there are many other fine forests left, and timber milling is an important industry.

The absence of frosts allows the growth of such Mediterranean trees as the orange, lemon, olive, and vine ; whilst deciduous fruits (apples and pears) flourish. But Auckland is pre-eminently a dairying province, and dairying is the leading industry.

We may include in the natural region now under discussion (though it lies outside North Auckland) the hilly peninsula known

as the Cape Colville Peninsula. This is the great gold-mining area of New Zealand, and has yielded half the gold found in the Dominion. Agriculture is here making rapid strides.

Auckland (population 220,000 in 1933), the largest city in New

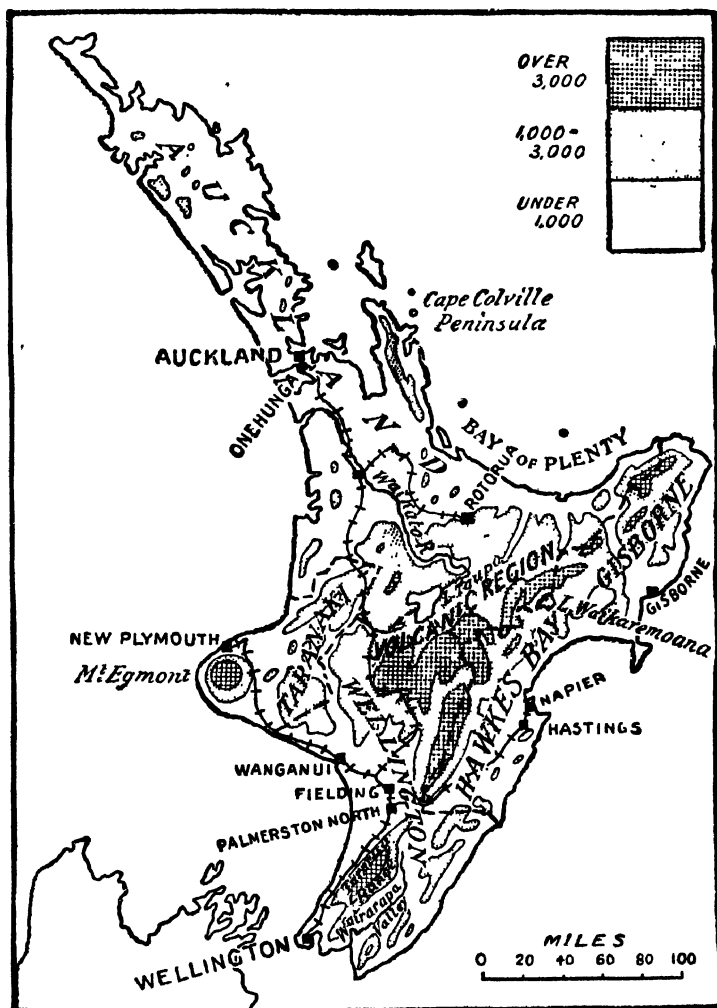


FIG. 405.—The North Island.

(The divisions marked are the old provinces.)

Zealand, is situated on the fine Waitemata Harbour, where the isthmus is only about half a dozen miles wide. It has the advantage of a second but much shallower harbour at Onehunga, on the southern (or south-western) side of the isthmus. Auckland is connected by rail with Wellington, 426 miles away, as well as with the northern

part of the peninsula. Situated as it is towards the northern end of New Zealand, Auckland is nearer the great ports of North America, San Francisco and Vancouver, than are the other ports of New Zealand. This is one reason why it is a popular port of call for liners between Australia and America (see Fig. 199). *Hamilton* (18,000 in 1933) lies south of Auckland at the head of navigation of the Waikato River. It is the business centre of a prosperous agricultural and dairying country.

The Volcanic Region of the North Island.—Forming roughly the centre of the volcanic region is Lake Taupo. The northern half lies in Auckland province, the southern half in Wellington, the western fringe in Taranaki. To the north is Rotorua, the centre of New Zealand's geyserland and a well-known health resort and spa. To the south of the region are the volcanic giants Ruapehu, Ngauruhoe, and Tongariro. The western part of the volcanic region is sometimes called by New Zealanders the "Main Trunk District." Through it passes the main trunk railway from Auckland to Wellington, and the area is a great stretch of fine forest country, for long the domain of a warlike Maori chief.

Taranaki and the Western Portion of Wellington.—The lowlands of the south-western part of the North Island are very fertile and important. Taranaki is a province of dairy farms, many of them under the shadow of the beautiful snow-capped volcano, Mount Egmont. There are many up-to-date dairy factories, and the further development of hydro-electric power will continue to improve the quantity and quality of the output of milk, butter, and cheese.

New Plymouth (19,000 in 1933) is the capital and principal port of Taranaki, and has an artificial harbour, though partly protected by natural features. Wellington is one of the most productive provinces in the Dominion, and west of the mountain divide dairying is the leading occupation; there is also a varied agriculture, and the province leads in the production of New Zealand flax. Great flax swamps are passed by the railway going northwards from Wellington. Palmerston North (23,500), Feilding, and Wanganui (28,000) are the centres for the region. *Wellington* (146,000 in 1933), the capital of New Zealand, is well situated on the large deep harbour of Port Nicholson. Notice the fine central position of Wellington and its ability to serve as the outlet for both east and west coasts.

The East Coast.—The east coast corresponds exactly with the old land district of Hawke's Bay and that part of Wellington lying east of the Tararua Range. The province includes also part of the shores of the Bay of Plenty. We have already learnt that the east side is the dry side of New Zealand and, as we should expect, the great sheep-farming centre of the Dominion. This is true of Hawke's

Bay as well as of many parts of eastern Wellington. In the rich Wairarapa Valley of Wellington and the plain of south-western Hawke's Bay dairying is rapidly increasing in importance. Apples, pears, and peaches grow well, while the sunny climate and sheltered position make vine-growing and wine-making possible.

Napier (19,000 in 1933) is the principal town and port. *Hastings* (17,000 in 1933) is a growing centre fourteen miles to the south. Electric power for the whole of the east coast will be provided by the works utilizing the outfall from Lake Waikaremoana. *Gisborne* (17,000 in 1933) is the centre of the northern part of the east coast.

SOUTH ISLAND

The West Coast.—Lying between the crest of the Southern Alps and the sea is the province of Westland. In the middle of the west coast there is a narrow coastal plain, but southwards the mountains come right to the coast, and one passes into the beautiful fjord country of Southland. The northern part of the west coast lies in the province of Nelson, but the fertile sheltered part of this province lies round the shores of Tasman Bay. The west-coast region as a whole is a very wet one; all parts have upwards of 75 inches of rain. The lower slopes of the mountains—most of the province of Westland—are forested and sparsely populated, whilst the higher parts of the mountains and the fjord country may be described as uninhabited. The scenery of much of the coast and mountains is very fine; the Franz Josef and Fox Glaciers descend to within 700 feet of sea-level. *Hokitika* is the starting-point for tourists visiting the glaciers. Although dairying is being developed, the chief importance of the west coast lies in its mineral resources. The two leading coal fields are round the coal ports of Greymouth and Westport. In the 'sixties of last century "gold rushes" to the rich alluvial gold fields were the means of settling the country, and a little gold is still obtained, especially near Reefton. The piercing of the Southern Alps by the Arthur's Pass tunnel (the longest tunnel in the British Empire) has placed the west-coast coal fields in direct touch with the Canterbury Plains, and should do much to develop the country.

Marlborough and Tasman Bay.—The north end of the South Island is cut off by mountain ranges from the west coast and from the Canterbury Plains, and can be considered as forming a distinct region. The provinces as a whole are hilly and the small areas of good, flat land have become the centres of development. In Nelson, around the mild and sunny shores of Tasman Bay, a busy fruit-growing area has developed. *Nelson* (13,000 in 1933) is the centre of the industry, and an export trade in apples and pears (sent to England and South America) has been built up of recent years.

Hops grow well in the same region. Cement is manufactured at Golden Bay, and the iron ore of Parapara is being developed. In Marlborough the climate is drier, but the plains are more extensive. The Wairau Plain was an early area of settlement, and grows excellent barley, as well as seed peas for distribution through the Dominion. The hills of Marlborough Province support large numbers of sheep.

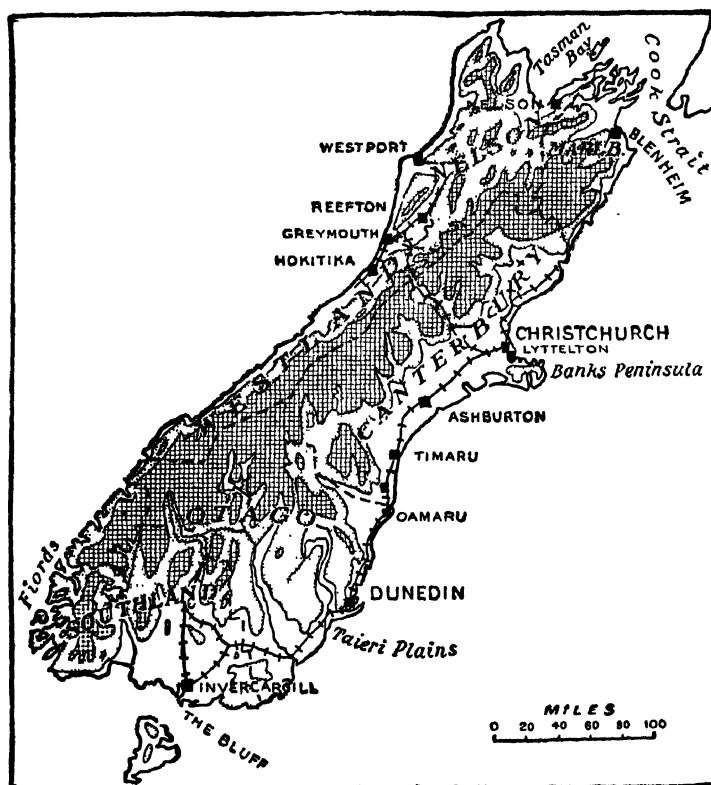


FIG. 406.—The South Island.

Blenheim, the business centre, is four hours by steamer from Wellington across the Cook Strait.

The Canterbury Plains and Downs.—The Canterbury Province is one well marked off by nature and really consists of four parts :

(a) The slopes and spurs of the Southern Alps with their beautiful glacial lakes.

(b) A belt of undulating country—the “Downs” between the mountains and the plain. This downland approaches close to the coast at both the northern and southern ends of the province.

(c) The Canterbury Plains, a broad, gently undulating, gravel plain, occupying the centre of the east coast.

(d) The hilly Banks Peninsula, attracting a heavier rainfall than that found on the Canterbury Plains.

The whole province lies on the lee side of the Southern Alps, and so is the driest province in New Zealand. Nearly all the plainland receives less than 25 inches of rain a year. The Canterbury Plains may be described as the chief grain-growing district of the Dominion. The leading cereal is wheat, and average yields are high. Other crops are clover, peas, and grasses—often grown for seed purposes. Generally speaking, the hill country is utilized for sheep-raising, but large numbers of sheep are sent annually to the rich Canterbury Plains for fattening. Hence, the high quality of mutton from the region. Dairying is being developed and fruits grow well.

Christchurch (113,000 in 1933), with its port *Lyttelton*, is the centre of this rich region. *Lyttelton* is reached by a frequent service of fast steamers from *Wellington*, and from *Lyttelton* and *Christchurch* there is railway communication as far as *Invercargill* in the extreme south.

Ashburton, *Timaru* (19,000), and *Oamaru* are prosperous centres of the plains.

Otago and Southland.—Otago consists mainly of a plateau of ancient rocks, deeply cut into by valleys largely of glacial origin. The plateau is continued into Southland and on the west coast includes the beautiful fjord country. On the south-east coast there are several fertile plains, in which the population is concentrated. It was the discovery of gold which first attracted settlers to Otago—in the 'sixties of last century—and *Dunedin* (88,000 in 1933) for a time became the commercial centre of New Zealand. The prosperity of the region now depends mainly on sheep-rearing and agriculture. The hill country affords pasturage to large numbers of sheep, whilst the fertile plains are being given over more and more to agriculture. The *Taieri* plains, south of *Dunedin*, and the plains of Southland grow oats; barley grows well round the beautiful inland lakes, which incidentally attract numerous tourists. Central Otago is celebrated for its fine fruit; some parts are sufficiently dry to need irrigation. *Invercargill* (24,500 in 1933) is the leading town of Southland, and is separated by a few miles from its port, known as *The Bluff*.

DEPENDENCIES OF NEW ZEALAND

The Cook Islands.—The Cook Islands were attached to the government of New Zealand in 1901. There are twelve inhabited islands (including *Niue*) with a total population of 15,500. Of these

3,750 are in Niue and 3,700 in Rarotonga. Wireless stations are now established on four of the islands. The leading exports are copra, oranges, bananas, tomatoes, and other fruits.

Nauru.—Nauru, or Pleasant Island, lies nearly on the equator. Before the Great War it was a German possession. It is of considerable importance, owing to the rich deposits of phosphate. Between 1921 and 1933 an average of nearly 400,000 tons a year of phosphate was exported from Nauru and Ocean Islands, mainly to Australia, New Zealand, and Japan. The deposits in the two islands are estimated to contain 100 million tons. The yearly production of phosphate is divided between the governments of Great Britain, Australia, and New Zealand in the proportion of 42, 42, and 16. It is of great importance to Australian agriculture.

The Union Group.—The Union Group is also administered by New Zealand. The islands are inhabited by about a thousand natives, and produce copra.

Western Samoa.—The former German islands of Western Samoa are administered by New Zealand under mandate from the League of Nations. They lie in tropical waters 1,700 miles north-east of New Zealand. There are two main islands, Upolu (430 square miles) and Savaii (703 square miles). Upolu is covered with luxuriant tropical vegetation; it abounds in fertile valleys with swift mountain streams. There are now extensive plantations of coconuts and cacao. There are 48,000 inhabitants in the island, including 2,000 Europeans. Apia is the principal town; copra and cacao beans are the only exports of importance. The island of Savaii, though larger, is very mountainous (rising to 4,000 feet) and is less productive.

OTHER PACIFIC ISLANDS

The Fiji Islands belong to the British Empire, and lie on the trade routes between Australia and New Zealand on the one side, and Canada and the United States on the other.

New Caledonia is a French possession, formerly used as a convict settlement. It has large deposits of nickel ore.

The Hawaiian Islands belong to the United States. The principal town, Honolulu, is now a large city, and an important port of call for liners crossing the Pacific. The islands are famous for their pineapple plantations; the tinning and export of pineapples is now a large industry. There is a famous active volcano, Mauna Loa, on one of the islands, and on its flanks is a subsidiary volcano (Kilauea), of which the crater is occupied by a lake of molten lava which can actually be visited and studied.

Other Islands.—Some of the tiny islands of the Pacific are

used as "signal stations." They are equipped with wireless apparatus and pass on messages received from ships. Examples of islands used for this purpose are Thursday Island, Norfolk Island, Fanning Island (these are cable as well as wireless stations), Ocean Island, etc.

NEW GUINEA

The island of New Guinea is sometimes described as the largest in the world. It is nearly 1,500 miles long, and has an area of about 300,000 square miles. It is situated in the region of equatorial climate, and the lowlands are covered with hot, wet, evergreen forests. The interior is occupied by a very lofty plateau, said to be covered with dense tropical grassland. The western part of the island is part of the Dutch East Indies; the south-east, under the title of Papua, is administered by Australia; whilst the north-east, now known as the Territory of New Guinea, was formerly a German possession, and is now administered under mandate by the Australian Commonwealth.

Many of the inhabitants of New Guinea are wild, cannibal tribes, and the interior of it is still little known. The white population is slowly increasing, and both in Papua and New Guinea plantations are extending, especially those of coconuts and rubber. Minerals, including gold and oil, are believed to exist in payable quantities. Included under the mandated territory are the Bismarck Archipelago and the Solomon Islands.

ANTARCTICA

The barren Antarctic continent consists probably of a high plateau of land, but for the most part is covered by a great depth of ice and snow. Under the name of the Ross Dependency a large sector has been placed under the government of New Zealand. The whale-fishing industry is one of great value in the territorial waters, and is being exploited mainly by Norwegians under licence from the New Zealand government.

EXERCISES

1. The Foreign Trade of the Commonwealth of Australia—Figs. 372 to 377—should be kept up to date from the *Annual Reports on the Balance of Trade* or the *Statesman's Year Book*.
2. Other statements and figures in the section on Australia may be checked from the *Official Year Book of the Commonwealth of Australia*.
3. The Foreign Trade of New Zealand. Keep up to date from the *Annual Reports on the Balance of Trade* or the *New Zealand Official Year Book*.

EXAMINATION QUESTIONS

1. Compare and contrast the sheep-rearing industry of Australia with that of New Zealand. (*Univ. London Inter. B. Com.*, 1925.)

2. Compare and contrast railway development and railway communications in North America and Australia. (*Univ. London Inter. B. Com.*, 1927.)

3. Suggest a scheme of railway development for Australia. (*Univ. Oxford Dipl.*, 1926.)

4. Describe and account for the arrangement of vegetation zones around the arid interior of Australia. (*Univ. Oxford Dipl.*, 1926.)

5. How far may the Murray-Darling lowlands be said to constitute a single Natural Region? (*Univ. Oxford Dipl.*, 1926.)

6. Outline the outstanding geographic factors which have determined Australia's economic development. (*Univ. Toronto 1st Year Hous.*, 1925.)

7. *Either*, Compare the physical character and economic development of the lowland regions in the two main islands of New Zealand. (*Univ. Oxford Cert.*, 1926.)

Or, Discuss the geographical factors affecting the distribution of (a) sheep in South, and (b) cattle in North Island, N.Z. (*Univ. Oxford Cert.*, 1926.)

8. Compare the climates of the North and South Islands of New Zealand. To what extent does the climate of the North Island conform to the Mediterranean type? (*Univ. Oxford Dipl.*, 1926.)

9. Trace the effect of the configuration of *either* the South Island of New Zealand, *or* Eastern Australia upon the distribution of population and the position and growth of towns. (*Univ. Oxford Dipl.*, 1926.)

10. Discuss on a geographical basis the problem of the peopling of tropical Australia. (*Univ. Oxford Dipl.*, 1926.)

11. Discuss the population problem in either Australia or the Argentine as regards distribution, immigration and racial elements. (*Univ. Sheffield B.Sc.*, 1925.)

12. What is an artesian basin? Discuss the rôle of artesian basins in the present and the future development of Australia. (*Univ. London Inter. B. Com.*, 1927.)

CHAPTER XIX

ASIA

GENERAL CONSIDERATIONS

Position and Size.—Asia is the largest of all the continents and comprises nearly one-third of the land of the globe. With the exception of some of the islands of the East Indies, it is situated entirely in the Northern Hemisphere. It stretches from the frozen shores of the Arctic Ocean, far inside the Arctic Circle, into the

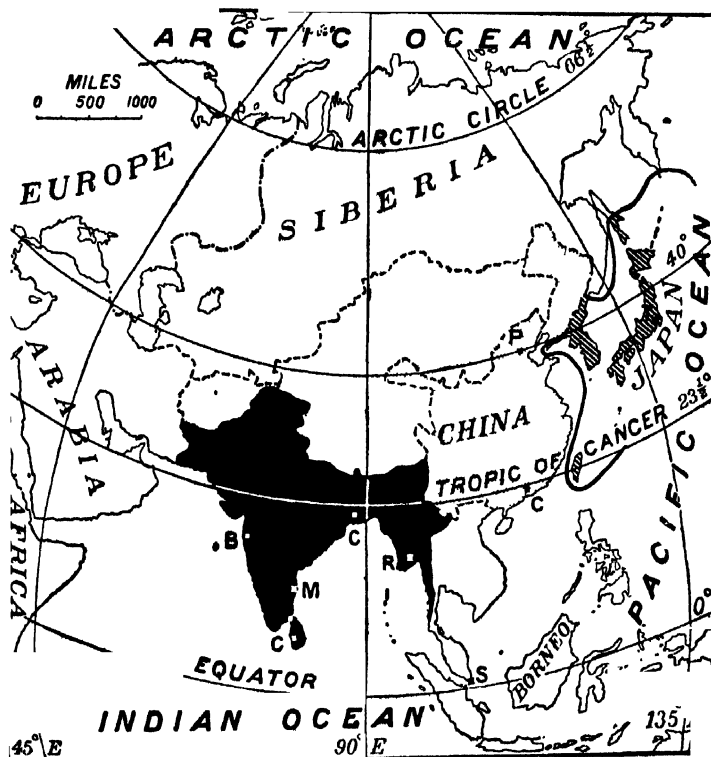


FIG. 407.—The position and size of Asia.

The approximate latitudes of the towns marked should be noted.

Tropics, and the southernmost part of the mainland near Singapore nearly reaches the equator. From west to east it stretches from 25° E. to 170° E.—around more than one-third of the Earth's circumference. Some parts of Central Asia are more than 1,500 miles from the sea. The positions of the Arctic Circle (66½° N.) and the

Tropic of Cancer should be carefully noted and also the central meridian, 90° E. In particular the situation of India and China in relation to these lines and the latitude of Japan when compared with the British Isles and the New England States should be noticed.

Physical Features.—The great continent of Asia can be divided, according to its structure or physical features, into four parts. This division has been made in Fig. 408.

1. *The Northern Lowlands*, forming a great triangle of low land bordered on the north by the Arctic Ocean. This great

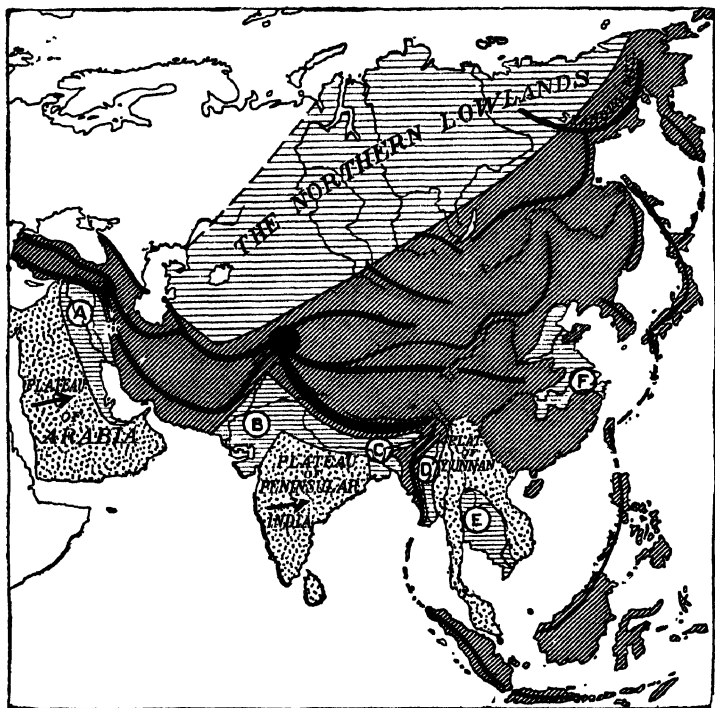


FIG. 408.—The main physical features of Asia.

area of lowland, comprising most of Siberia, is only separated from the Great European Plain by the low range of the Ural Mountains.

2. *The Central Triangle of Young Folded Mountains* and the plateaus which they enclose. This is a great area of highlands and mountains forming a triangle in the centre of Asia. There is a big extension from the triangle running westwards and ending in Asia Minor, and there are other extensions—lines of folded mountains running away to the south-east and forming some of the ranges of Indo-China and the East Indies.

3. *The Old Plateaus of the South*, formed mainly of old, hard, crystalline rocks. There are three big masses: (a) the Plateau of Arabia; (b) the Plateau of Peninsular India; and (c) the Plateau of Yunnan and Indo-China.

4. *The Great River Valleys*, found between the old plateaus and the fold mountains. These are the basins of the Tigris and Euphrates, the Indus, the Ganges-Brahmaputra, Irrawaddy, etc.

Each of these physical divisions may now be considered in order.

1. *The Northern Lowlands*.—This great plain is formed of the basins of the Ob, Yenesei, and Lena. In the south-west is a small area of inland drainage, draining into the Sea of Aral. The three great rivers are very long and very slow, for the slope

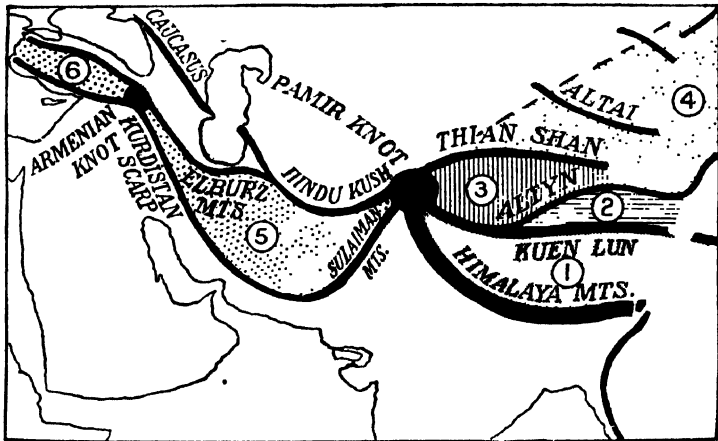


FIG. 409.—Key to the mountain ranges shown on Fig. 408.

down to the Arctic Ocean is very gradual. The rivers flow towards the very cold north, and their lower courses are frozen for many months of the year. When this happens the water from the upper courses cannot escape to the sea, but spreads over the land and forms great swamps.

2. *The Central Mountainous Triangle*.—To understand the numerous mountain ranges let us start from the Pamir Knot. They are shown, very much simplified, in Fig. 408. From this region mountain ranges radiate in nearly all directions.

To the west there are two main ranges. One runs south-west as the Sulaiman Mountains, continued beyond the Bolan Pass as the Kirthar Range, and then along the coast of the Persian Gulf (Makran Coast), continuing as the Kurdistan scarp into Asia Minor, where it joins up with the northern branch to form the Armenian

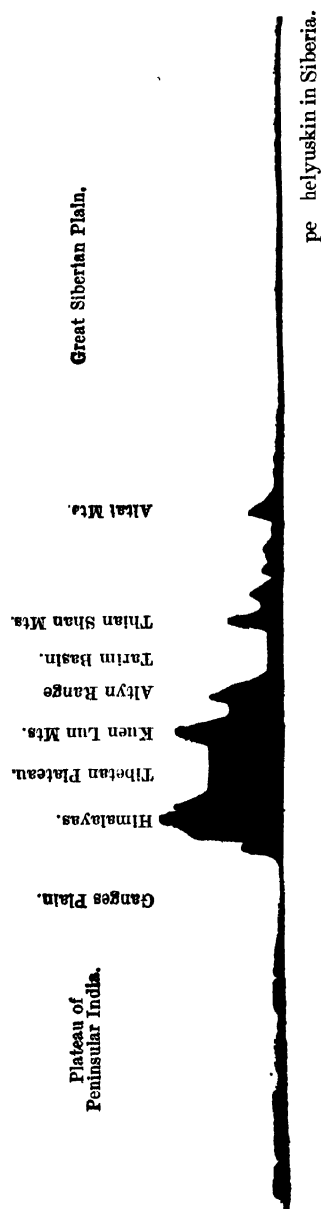
Knot. Thence it runs along the southern coast of Asia Minor as the Taurus Mountains. The other branch runs westwards as the Hindu Kush, along the north of Persia, the shores of the Caspian Sea (Elburz Mountains), and along the northern coast of Asia Minor. Just where this line enters Asia Minor it joins up, as already noted, with the southern branch to form the Armenian Knot. A branch from this northern line forms the Caucasus Mountains.

Running eastwards from the Pamir Knot there are four main lines. The most southerly is the greatest range in the world—the Himalayas. Further north are the two ranges, close together, of the Kuen-lun and Altyn Mountains. Still further north are the Tien Shan Mountains. The latter forms one of several ranges and chains of mountains, such as the Altai, which run roughly from east to west and together make up a composite line extending north-eastwards from the Pamir Knot right across Asia.

There remain for consideration two other groups of young fold mountains :

(a) Running at first south-westwards and then southwards from the eastern end of the Himalayas is a big fold which passes through Burma as the Arakan Yomas, continues through the Andaman and Nicobar Islands to Sumatra and Java and other islands of the East Indies.

(b) Forming “festoons” or loops down the east coast of Asia are the mountain chains which form the Kurile Islands, the Japanese Islands, the Riu Kiu Islands, the Philippines, etc. On the mainland are other mountain loops such as the Stanovoi and Verkhoyansk ranges.



Between the great lines of fold mountains are the plateaus : many of them are nearly level plains surrounded by the ring of

mountains and forming areas of inland drainage. They are marked by the following numbers on Fig. 409 :

1. The plateau of Tibet, or the "Roof of the World," is the highest plateau in the world—more than 12,000 feet above sea-level. It lies between the Himalaya Mountains on the south and the Kuen-lun on the north.

2. There is a small basin slightly lower, between the Kuen-lun and Altyn ranges. It is largely occupied by a swamp.

3. The Tarim Basin is an important area lying between the Altyn Mountains and the Tien Shan. It is a dry region; what water there is drains inwards into a small lake.

4. The Desert of Gobi, or Shamo, forms an enormous plateau south of the Altai and Yablonoi Mountains and north-east of the Altyn Mountains.

5. The plateau of Iran, occupying most of Persia, lies between the northern and southern ranges which run westwards from the Pamir Knot.

6. The plateau of Asia Minor west of the Armenian Knot, between the Black Sea and the Mediterranean.

The position of these plateaus is most easily remembered in connection with the mountain ranges by which they are enclosed.

The important rivers draining eastwards from the mountain triangle to the Pacific Ocean should be noted. The largest are the Amur, Hwang Ho, Yangtze.

3. *The Old Plateaus of the South.*—Arabia is a great plateau of old, hard rocks, which shows a steep edge to the Red Sea on the west and slopes gradually to the east till it passes into the Tigris Valley. The slope is very gradual and not much broken up, for the country is dry and there are few rivers.

(a) The plateau of Peninsular India also slopes from west to east. The steep western edge forms the Western Ghats, the low eastern edge the Eastern Ghats. This plateau is much cut up by rivers like the Mahanadi and Godavari.

(b) The plateau of Yunnan and Indo-China stretches from the Shan States in Burma eastwards. A long branch of old rocks runs down into the Malay Peninsula. This plateau is also much broken up by rivers, such as the Salween, Mekong, and the upper course of the Yangtze.

4. *The Great River Valleys.*—These are fertile areas of lowland with vast stretches of alluvial soil. Note their position on the map (Fig. 408)—the Tigris and Euphrates Basin (A), the Indus Basin (B), the Ganges-Brahmaputra Basin (C), the Irrawaddy Basin (D), the Mekong Basin (E), and the Yangtze Basin (F).

Before leaving this section study Fig. 410, which is a section across Asia from south to north. In the south, notice the low tableland of Peninsular India; then the broad, flat plain of the Ganges; and then the sudden rise to the enormously high Himalaya Mountains. To the north of the Himalaya Mountains there is a gradual descent to the Arctic Ocean by means of a series of "steps" or terraces. The plateau of Tibet is the highest step; going north-

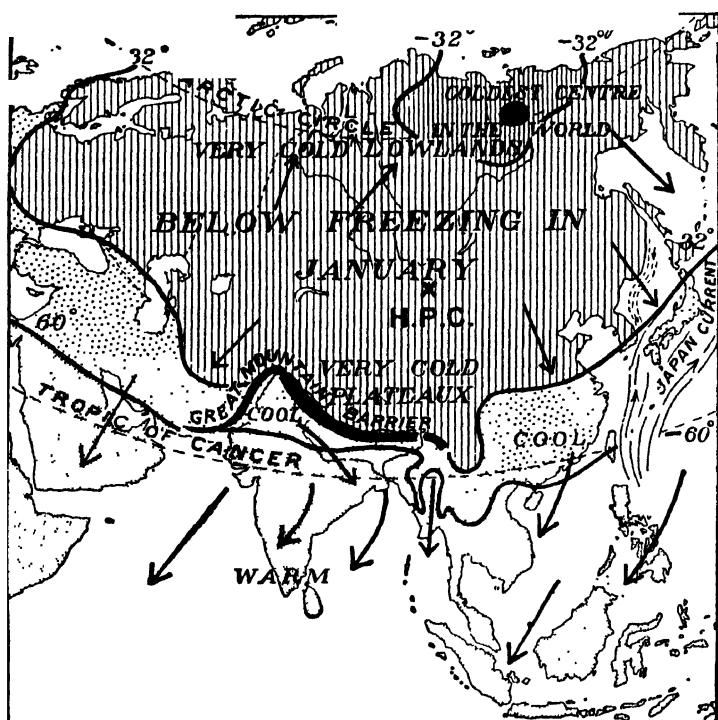


FIG. 411.—Conditions in the cold season showing January temperatures and winds.

Notice that the whole of Asia north of the great Himalayan mountain barrier is freezing in January. Notice the cold, dry winds blowing outwards from Central Asia; they make China and Persia cold, but are little felt in India. The warm Japan current keeps Japan warm.

wards the steps become gradually lower till the great Northern Plain is reached.

Climate.—In considering the climate of North America it was noted that two physical factors were of paramount importance in determining the climates of the continent. The same is true of Asia, but the conditions are the reverse of those found in North America. In the first place there is a great mountain barrier—the Himalayas—running from east to west which cuts off the south of

the continent completely from the north. In the second place the centre of Asia is occupied by a great mass of mountains and highland, far removed from the sea, and is therefore subject to great extremes of temperature.

Winter conditions are illustrated in Fig. 411. The centre and north become very cold indeed, so that there is an enormous mass of cold air all over the centre of Asia. This gives rise to a region of high pressure with strong, cold, outblowing winds during the

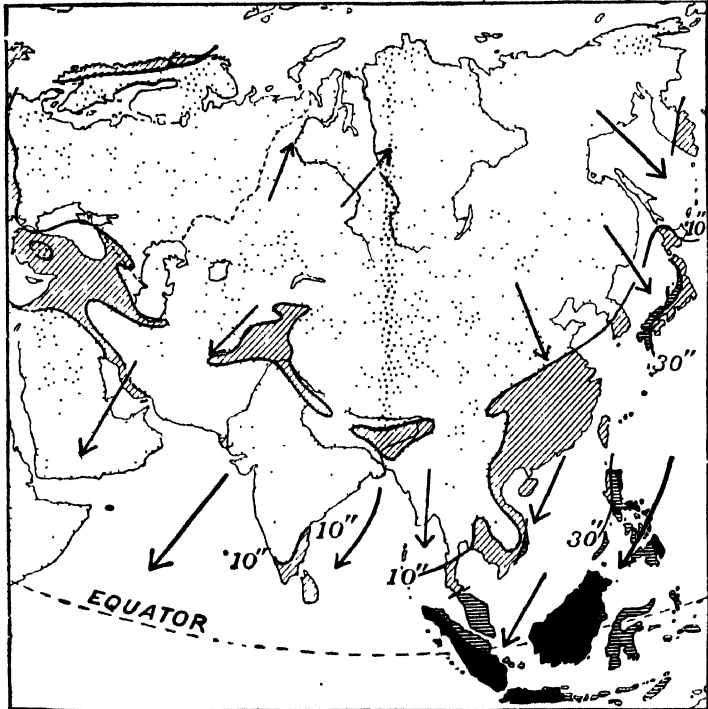


FIG. 412.—Conditions in the cold season—rainfall from November 1st to April 30th.

The cold winds bring very little rain except after they have crossed the sea. The rainfall lines marked are 10, 30, and 60 inches. Regions with more than 60 inches shown in black.

winter months. The winds are dry because they are land winds ; the only regions where they become damp are where they cross some area of sea. As shown in Fig. 412, nearly the whole of Asia receives very little rain in winter. The exceptions—notably the north coasts of Japan and the East Indies—should be noted. It is particularly during winter that the Himalaya Mountains form a great climatic barrier and prevent India from feeling the cold winds from Central Asia such as sweep over China.

Summer conditions are shown in Fig. 413. In summer the interior of Asia becomes very hot and low-pressure areas are formed. The chief of these is in the north-west of India over the Punjab plains, and is responsible for the well-known Indian monsoon. Although at a considerable elevation, the interior plateaus with the Desert of Gobi become greatly heated, but the winds which are drawn in across China towards these centres are not as strong as the south-west monsoon of India. The inflowing winds of summer

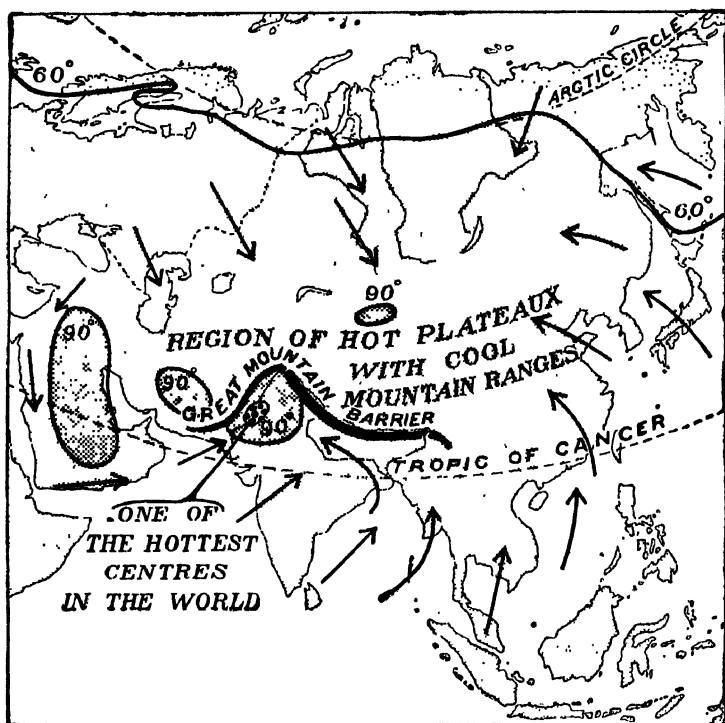


FIG. 413.—Conditions in the hot season showing July temperatures and winds.

The sun is shining vertically over the Tropic of Cancer and large areas get very hot. The cool rain-bearing winds are blowing inwards towards the low-pressure centres lying over the hot areas.

are from the ocean, and therefore moisture laden. As shown in Fig. 414, summer is the rainy season over most of Asia.

Climatic and Natural Vegetation Regions.—Collecting together the details given in Chapter IV (Part I), it will be noticed that nearly all the principal types of climate are represented in Asia with the exception of the tropical.

The Tundra stretches as a belt across the north (Arctic climate).

The Coniferous Forest Belt lies to the south of the Tundra and also stretches right across the continent (Cold Temperate Climate).

It will be remembered that much of the forest suffers from the marshy nature of the Siberian lowlands.

The "Temperate" Grasslands or Steppes occupy two principal areas—South-Western Siberia and a fringe round the Mongolian plateau. The latter area is perhaps the least developed of all the tracts of mid-latitude grassland in the world ("Temperate" or Mid-Latitude Continental Climate).

Mediterranean Vegetation occupies a small area in the south-

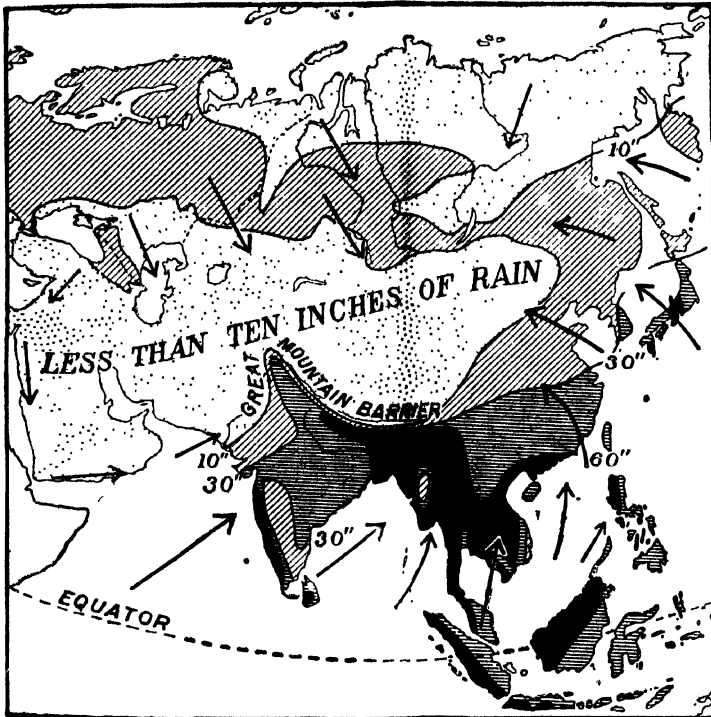


FIG. 414.—Conditions in the hot season—rainfall from May 1st to October 31st.

The warm moist winds bring a heavy rainfall to the coasts. All parts marked black have more than 60 inches of rainfall. But the winds lose all their moisture before they reach the hot interior of the continent, which has less than ten inches of rain in the half-year.

west of Asia—the fringes of Asia Minor and Syria, where the continent borders the Mediterranean Sea. Much of Mesopotamia and, indeed, of Persia and Baluchistan might be described as having a very dry type of Mediterranean Climate.

Deserts and Semi-deserts occupy a very large area in South-Western and Central Asia, as shown in Fig. 415 (Hot and Temperate Desert Climates).

Temperate Deciduous Forests are not a characteristic type of

Asiatic vegetation. As in North-Eastern America there is, in North-Eastern Asia, an area with a Laurentian type of climate and though deciduous trees flourish, coniferous trees are more conspicuous in the natural vegetation (e.g. Japan).

Warm Temperate Forests may be described as the characteristic vegetation of China, though the forests themselves have been removed over very large areas (China type of Climate).

Monsoon Forests vary in character according to the amount of

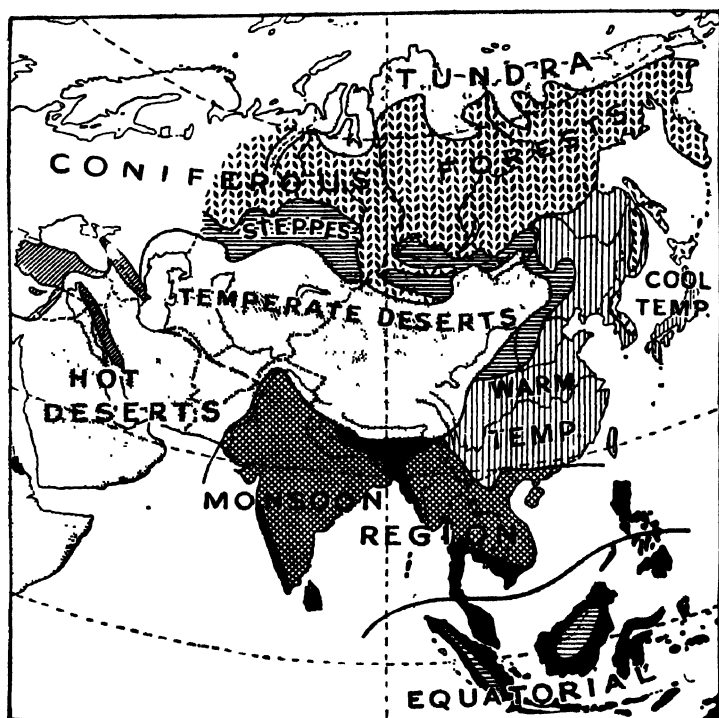


FIG. 415.—The natural vegetation of Asia.

Compare this map with what is said about the climates of Asia. In the part marked "Monsoon Region" evergreen forests are found in the wettest parts, monsoon forest in the areas with a moderate rainfall; scrubland where the rainfall is poor, and desert in the driest parts.

rainfall, and will be described in detail under India (Tropical Monsoon Climate).

Hot, wet, evergreen forests are not restricted to the area having a typically Equatorial Climate, but extend also, as shown in Fig. 415, to the wetter parts of the monsoon lands.

Population.—Asia, which is the largest continent, has also more people than any other continent. But, curiously enough, most of the people are found in two countries—India and China. Look at Fig. 416 and notice how thickly populated these countries

are in comparison with other parts. There are also large numbers of people in Japan and the East Indies. Just as the Himalayas form a great climatic barrier, so they form also a great barrier to man, and divide the two great races of mankind—the yellow-skinned, oblique-eyed Mongolians on the one side and the brown-skinned Indo-Europeans (including the Indians) on the other.

Asia is often called the continent of extremes. It has the highest mountains and the highest plateaus as well as the largest

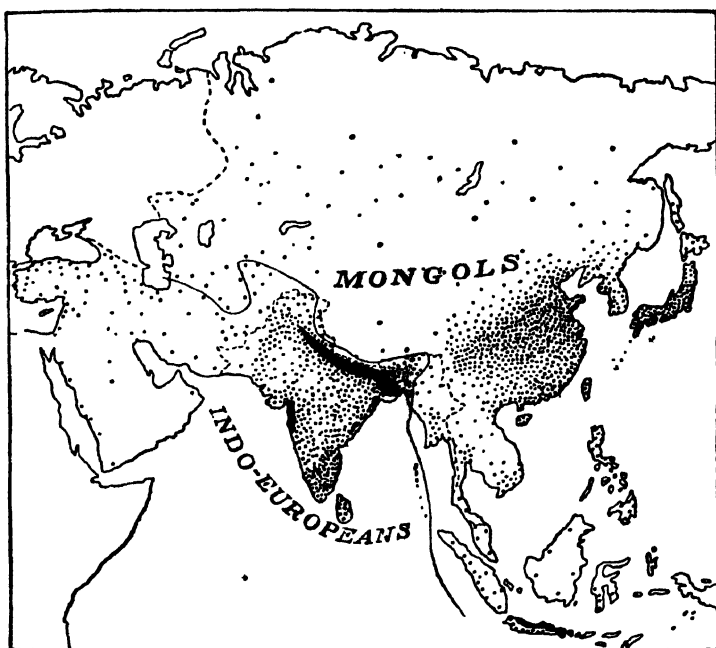


FIG. 416.—The population of Asia.

Each dot represents half a million people. Notice that the thickly populated countries are India, China, Japan, and Java. This little map is drawn on Gall's Projection, and so Asia appears a different shape from what it does on Figs. 411-415.

stretches of lowland in the world ; it has the coldest as well as some of the hottest places, the wettest and some of the driest, the most thickly populated and some of the most thinly peopled lands in the world.

INDIA AND BURMA ¹

India is one of the most fertile and most thickly populated countries in the world ; her people are the most advanced of all the races living in the Tropics, and boast a history of greatness going

¹ This section is based on the "Regional Geographies of India," Part IV, by L. D. Stamp (Longmans).

back for many thousands of years. At the present time India is achieving a greater unity than ever before. A common government and the use of English as a common language has done much to cement together for the first time 340,000,000 people of different races, languages, and religions. Thus unified, India is fast taking her rightful place amongst the great commercial nations of the world.

India is naturally shut in and defended by a great wall of mountains. There are two parts which lie outside the wall but still form part of the Indian Empire. They are the unimportant dry lands of Baluchistan, and the cold uninhabited plateau of Northern

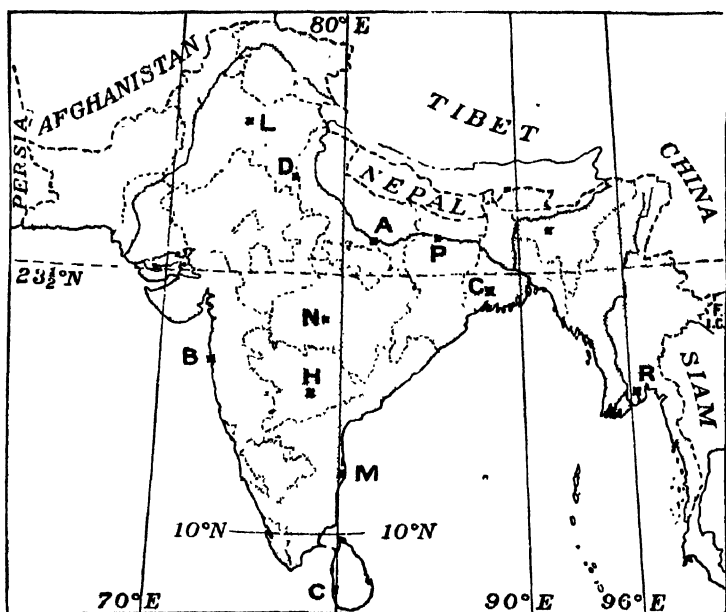


FIG. 417.—The position of India.

Kashmir. The large, important, and fertile land of Burma was made independent of India on April 1st, 1937, by the India Act of 1935. In many ways Burma is quite different from India. There are two areas lying inside the mountain wall which do *not* form part of India—the independent state of Nepal and the island of Ceylon.

Position and Size.—India lies entirely to the north of the equator. The southernmost point of the mainland, Cape Comorin, is in latitude 8° N. The Tropic of Cancer passes right through India, cutting the country into two. Although roughly half of India lies outside the Tropics, in the Temperate Zone, we always think of India as a tropical country, because it is well marked off from the rest of Asia by its mountain wall, and has a common type

of climate throughout. India and Burma stretch from longitude 61° E. to 101° E.—that is, one-ninth of the way round the globe. Longitude 70° E. passes through the Indus Valley, and 90° through the Delta of the Ganges.

India has 5,000 miles of land frontier and 4,000 miles of sea frontier, and an area of 1,550,000 square miles. Notice the favourable position of India for sea trade—with Europe *viâ* the Suez Canal; with Africa; with the Far East *viâ* Singapore; and with Australia. Burma has an area of 250,000 square miles. India takes its standard time from the meridian of $82^{\circ} 30'$, which is $5\frac{1}{2}$ hours ahead of Greenwich time. Burma has its own standard time, and Calcutta uses its own local time.

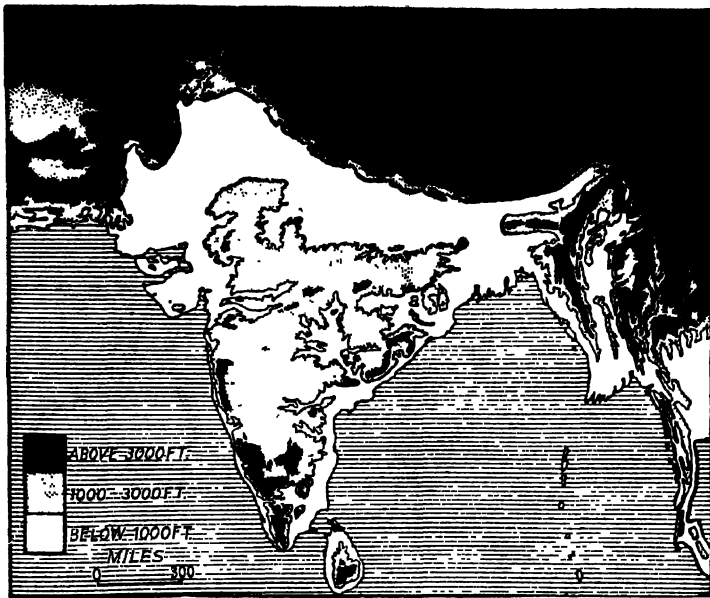


FIG. 418.—Physical or contour map of India.

Physical Features.—India is divisible into three main parts :

1. A great mountain wall.
2. A great lowland plain, the plain of Hindustan, through which flow three great rivers, the Indus, Ganges, and Brahmaputra and their tributaries.
3. A great plateau, the plateau of Peninsular India.

A fourth division must be added for Burma. Burma is composed chiefly of mountain ridges and long river valleys, nearly all running from north to south. Only one part of Burma is really flat, and that is the main valley of the Irrawaddy.

Compared with the size of the country, the coast-line of India

is short, for there are few bays or gulfs. Places in the heart of India, like Delhi and Nagpur, are thus a long way from the sea. The result is that India has few good harbours. The west coast of Peninsular India is rocky, and the sea is deep quite close to the coast. There are three inlets which form good natural harbours—Bombay, Goa, and Cochin; but the last of these is partly blocked by sand. The east coast of Peninsular India is less rocky, but the sea along the coast is too shallow for ships to approach the shore, whilst the surf makes it dangerous to land in small boats. The only important harbour on this coast, Madras, has an artificial harbour. Where the great Plain of Hindustan reaches the coast the

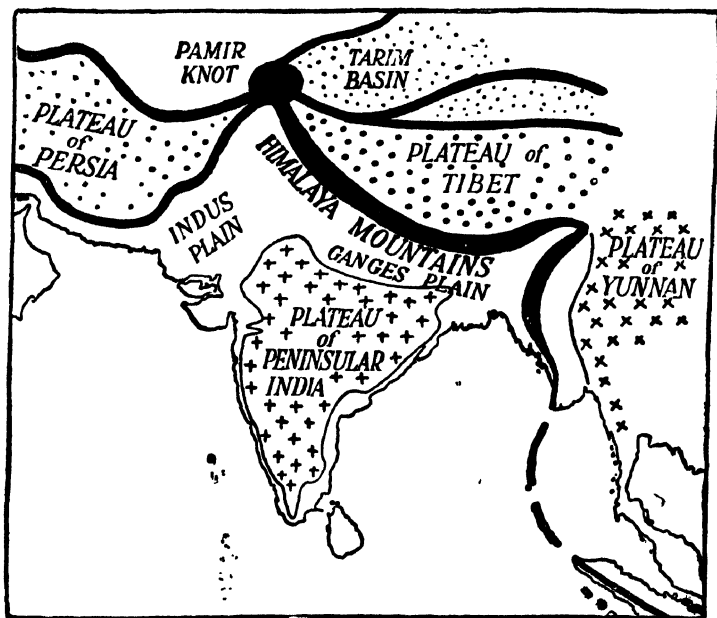


FIG. 419.—The mountains and plateaus of Southern Asia and the physical regions of India.

only harbours are certain river mouths, such as the River Hooghly on which Calcutta stands.

Ceylon is the only important island lying off the coast of India, to which it is very nearly joined by a line of sand-flats and rocks called Adam's Bridge.

The coast-line of Burma is very different from that of India itself. Both in Arakan and Tenasserim it is very broken up and fringed with numerous islands. There are numerous inlets suitable for harbours, but high mountains lie close to the coast, and so there are no important ports. The great port of Burma, Rangoon, lies on a river estuary.

The Mountain Wall.—From the Pamir Knot in the north the greatest range of all is that of the Himalayas (the “ abode of snow ”), with many of the highest mountains in the world : Mount Everest, 29,000 feet ; Kinchinjunga, 27,815 feet ; and many others. Another great range, which is really a northern branch of the Himalayas, runs eastwards from the Pamir Knot, and is known as the Karakoram Range. One of its highest peaks is Mount K₂, or Mount Godwin Austin (28,250 feet). To the north of the Himalayan Range lies the plateau of Tibet, the highest in the world.

Running south-westwards from the Pamir Knot and separating India proper from Afghanistan and Baluchistan, is the Sulaiman Range, passing southwards into the Kirthar Range.

The mountain wall between India and Burma has received various names. In the north it is a narrow wall, and is known as the Patkoi Hills ; then it broadens out into the Naga Hills and the Manipur Plateau, sending out a great branch westwards into Assam. This branch forms the Jaintia, Khasi, and Garo Hills. Southwards from Manipur are the Lushai Hills, and then again a narrow wall known as the Arakan Yoma. The Arakan Yoma reaches the sea at Cape Negrais, but is continued in the Andaman and Nicobar Islands.

On the eastern side of Burma there is another series of mountain ranges, running from north to south, near the border of China.

The Plain of Hindustan.—Inside the mountain wall, and forming a great curve from the Arabian Sea to the Bay of Bengal, is one of the most important plains in the world. It occupies the greater part of Northern India, and is more than 2,000 miles from end to end, and usually from 150 to 200 miles broad. This great plain is formed by the basins of three rivers and their tributaries. In the west and draining into the Arabian Sea is the River Indus. Farther east is the River Ganges, which flows south-eastwards into the Bay of Bengal. The city of Delhi, the proud capital of India, stands nearly on the water-parting between these two river basins. Before the Ganges reaches the sea it is joined by the third of the mighty rivers, the Brahmaputra.

Throughout the whole of the plain of Hindustan there is not a hill to be seen. The floors of the river valleys rise so gradually that the slope cannot be seen. Nearly 1,000 miles from the mouth the surface of the River Ganges is only 500 feet above sea-level.

The Plateau.—Nearly the whole of India south of the great plain of Hindustan is occupied by a plateau. The western side is the higher, and the surface slopes down towards the east. The western edge of the tableland is known as the Western Ghats. In the same way the lower eastern edge forms the Eastern Ghats. The Eastern Ghats are interrupted by a number of river valleys. The plateau as a whole is higher in the south—in Mysore—than it is in the north

Between the Western Ghats and the sea there is a narrow coastal plain; between the Eastern Ghats and the sea there is a broader coastal plain.

The surface of the plateau is by no means smooth. It has been deeply furrowed by river valleys. Then, towards the north a very important line of mountains runs across the plateau from west to east. These mountains are the Satpura Range, continued eastwards as the Mahadeo Hills and Maikal Range. This line is a very important one, for the mountains are not easy to cross, and so it cuts off "Northern India" from what is properly called "Peninsular India." Throughout history this line has been an important barrier. There are two other parallel lines--the Vindhya Range to the north and the Ajanta Range to the south--which have helped to make the line more important.

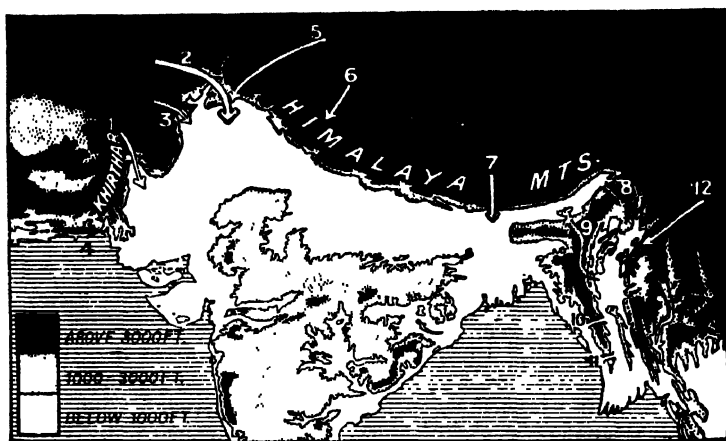


FIG. 420.—The mountain wall of India.

Northwards from the Satpura line the plateau slopes down towards the plain of Hindustan. In the north-west, interrupting the general slope, is the Aravalli Range.

Mountains of Burma.—The mountains of the province of Burma have a north-and-south alignment. In the west is the Arakan Yoma, in the east the Shan Plateau. Between the two is the lower range of the Pegu Yoma.

Doors through the Mountain Wall of India.—Generally speaking the passes through the mountain rampart of India are few and far between. In the north-west the two chief gateways are the Bolan Pass (marked (1) on Fig. 420) and the Khyber Pass (2). Another is the Gomal Pass (3). Another route is along the sea-coast of Makran (4). There are two difficult roads leading from the town of Srinagar in Kashmir, across the Zojila Pass and the Karakoram

Pass (5). From Punjab to Tibet is the Shipki Pass (6); but for hundreds of miles there is no route across the Himalayas until Darjeeling (7) is reached.

Across the mountains between India and Burma there are four main routes—the Tuzu Gap (8), the Manipur Route (9), the An (10), and Taungup (11) Passes. They are very little used, and nearly every one goes to Burma by sea—from Calcutta or Madras to Rangoon. From Burma into China are numbers of routes, of which the most important is the Taping Valley Route (12), *viâ* Bhamo.

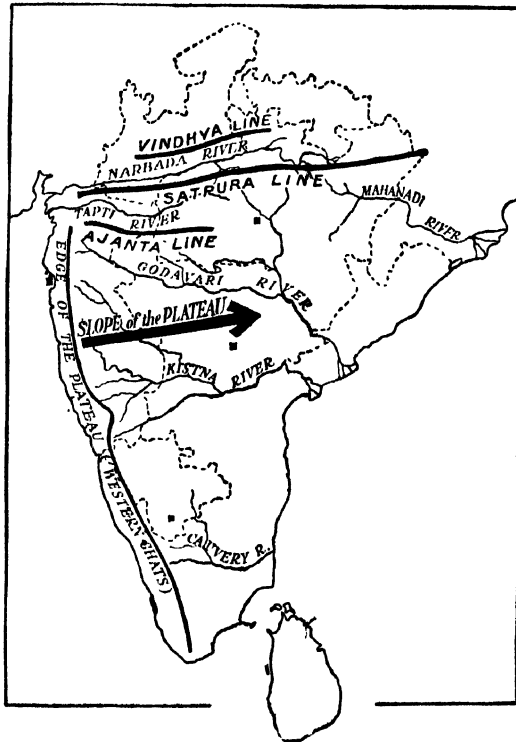


FIG. 421.—The rivers of Peninsular India.

The Rivers of Northern India.—The great rivers of the plain of Hindustan all rise in the mountain wall or beyond it. The rivers are fed with water from the gradual melting of the snow which lies on the mountains. They do not depend for their water entirely on the monsoon rains; they depend on the snow and rain which fall in the mountains at other times of the year. So we find these rivers are never dry; they always have some water in them. In the mountains these rivers are roaring, rushing torrents, pouring through gorges or narrow valleys, over waterfalls, and amongst great boulders. When they reach the plain of Hindustan, they

become slow, broad rivers wandering lazily across the plain. So flat is the valley that often the rivers desert their bed and make a new course. The three great river systems of Northern India are

1. The Indus River, with its tributaries the Jhelum, Chenab, Ravi, Bias, and Sutlej (the five rivers of the Punjab).
2. The Ganges River, with its tributaries the Jumna, Gogra, Rapti, and Gandak.
3. The Brahmaputra River, which has no important tributaries.

The Rivers of Peninsular India.—The rivers of Peninsular India are quite different from the rivers of Northern India. They rise in the hills of the plateau, and they are fed only by the monsoon rains. In the Dry Season they often become almost dry--so nearly dry that only the smallest boats can use them. Owing to the general slope of the plateau, the rivers rise near the Western Ghats and flow towards the Bay of Bengal. The most important are the Mahanadi, Godavari, Kistna, and Cauvery.

In the north of the Plateau two important rivers, the Narbada and the Tapti, both flow westwards.

The Rivers of Burma.—Like the Ganges and Brahmaputra, the rivers of Burma are mighty streams fed partly by mountain snows, and having water all the year round. The rivers flow in the valleys between the mountain ranges. In the heart of Burma is the Irrawaddy and its great tributary the Chindwin. Occupying a deep trench in the Shan Plateau is the Salween.

The Rivers of Baluchistan and Tibet.—Both Baluchistan and Tibet are very dry countries. The rivers only flow after rain, and empty into shallow lakes, which often dry up in the Hot Season. These areas are thus regions of inland drainage.

Importance of the Rivers.—In nearly all respects the rivers of Northern India are more important than those of Peninsular India

(a) They yield a constant supply of water which can be used for irrigation.

(b) They traverse, in their lower courses, broad, flat plains of fertile alluvium, very suitable for irrigation.

(c) They afford good highways of communication, though they are much less used than formerly.

On the other hand, the rivers of Peninsular India--

(a) Do not yield a constant supply of water.

(b) Have valleys less suitable for irrigation.

(c) Are not navigable for long periods of the year.

Notice also that the rivers of Northern India have a long upper course in the mountains; the rivers of Peninsular India have not.

Geology and Minerals.—The main features of the geology of India correspond very closely with the physical features. The mountain walls consist mainly of folded sedimentary rocks. The plain of Hindustan consists almost entirely of alluvium, and so do most of the coastal strips, and, of course, the river deltas. In the Ganges Valley the alluvium is many hundreds of feet thick. In the Upper Ganges Valley and the Punjab, the "Older Alluvium," as it is called, contains hard calcareous concretions about the size of nuts known as "kankar." In a country where there is no stone

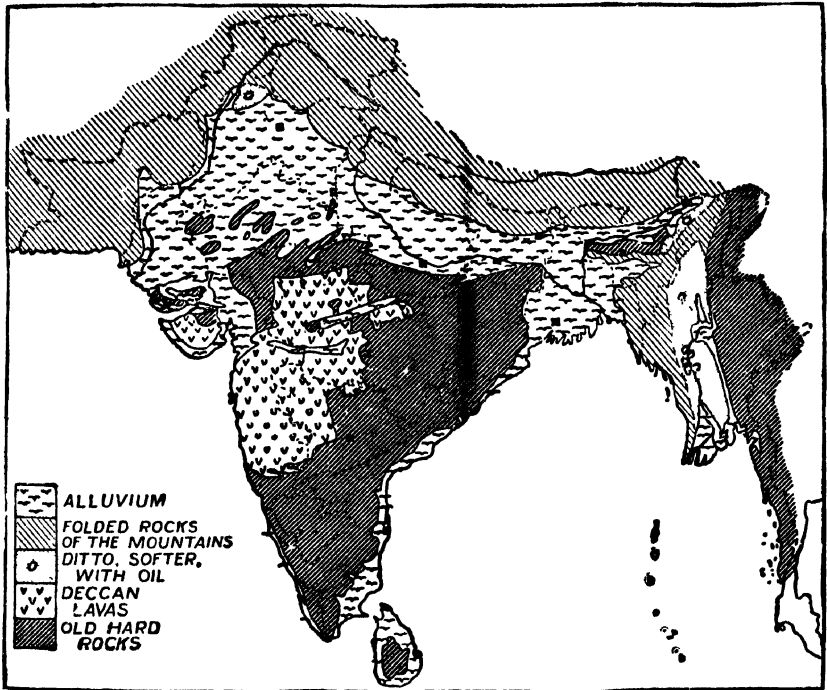


FIG. 422.—Geological map of India.

Note.—The area marked as alluvium in Ceylon is largely a lowland of laterite covering old hard rocks.

even these small nodules have value as road metal. The Indian Plateau consists mainly of very old crystalline rocks. This mass of old rocks was in existence long before the great Himalayan fold mountains were formed; it has for long ages formed a "stable massif" of much-altered and folded rocks. On the edge of the plateau are areas of sedimentary rocks, important because they are coal-bearing. Nine-tenths of the coal of India comes from the Jharia and Raniganj fields, in the north-eastern part of the plateau, but there are also coal-bearing beds in the Godavari Valley and on the northern slopes of the plateau. Nearly the whole of the north-

west of the plateau has been covered by great sheets of lava—the Deccan lavas. This region is one of the largest areas of lava in the world. Many valuable minerals occur associated with the old crystalline rocks. Gold is obtained especially from the Kolar Goldfield. Manganese comes mainly from the Central Provinces, but is also found near Vizagapatam and Mysore. Copper and iron are found in other parts of the plateau, especially in Bihar and Orissa. Mica is mined in Madras, and in the north-east of the plateau.

The island of Ceylon is a detached portion of the Deccan plateau and is famous for its graphite and gem stones.

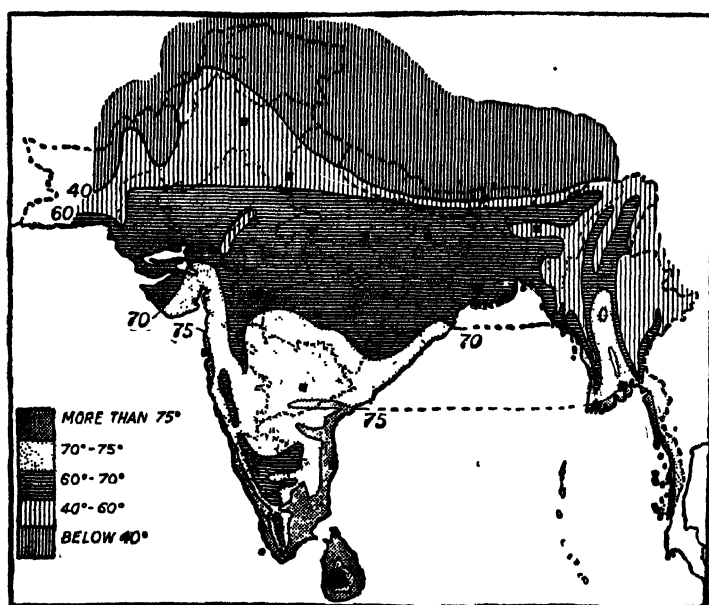


FIG. 423.—Temperature map of India for January.

The Shan Plateau of Burma, with its continuation southwards into Tenasserim, is another region of old hard rocks rich in minerals. One of the largest deposits of the ores of silver and lead in the world is found at Bawdwin; large quantities of tin and wolfram are obtained near Tavoy and Mergui; rubies and other precious stones are found near Mogok.

Mineral oil, or petroleum, is found in young soft rocks, usually on the borders of great fold ranges. Most of the oil formerly recorded from "India" comes from Burma—from the oil fields of Yenangyaung, Singu, Minbu, Yenangyat, and the Upper Chindwin. Some oil is also obtained in Assam, and a field is now being worked

near Attock, in the Punjab. The following table shows the value of the mineral production of India :

Mineral	Value (£ millions)		Chief localities
	1925	1933	
Coal	9.5	4.6	Jharna, Raniganj
Petroleum	7.7	4.7	Burma
Manganese ore	2.6	1.1	Central Provinces, Madras, B. and O.
Gold	1.7	2.1	Kolar (Mysore)
Lead	1.2	0.9	Bawdwin (Burma)
Mica	0.8	0.1	Madras, B. and O.
Silver	0.7	0.5	Bawdwin (Burma)
Salt	0.6	0.8	Madras, Bombay, Punjab
Iron ore	0.3	0.2	Bihar and Orissa
Tin ore	0.3	0.5	Burma
Copper	0.3	0.2	Burma

Keep the table up to date from the *Statesman's Year Book*.

Climate.—Considering first conditions during the *Cold Season* when the thermal equator lies far to the south of India, there is as one would expect, a gradual decrease in temperature from south to north—from a January average of 80° at Trivandrum to one of 55° at Lahore. At this season India is under the influence of cool, outblowing land winds—actually the North-East Trades. But the mountain wall protects India from the icy blasts which sweep over China in the winter. The winter is normally the rainless season in India. In the north-west, however, cyclonic rains fall during the winter months in the Punjab and may represent the ultimate eastern extension of the winter rain belt of the Mediterranean Sea. The October-December rainfall of the Madras Coast and Ceylon (Fig. 424) is due to storms coming at the end of the monsoon.

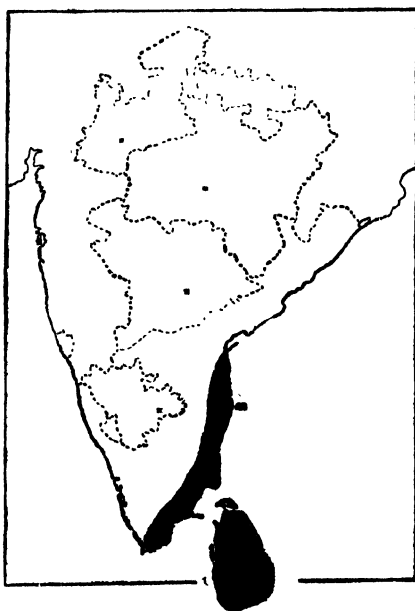


FIG. 424. —Cold season rains in Southern India and Ceylon.

Map showing the part of Peninsular India which has not less than 10 inches of rain in November and December.

In February, March, April, and May the thermal equator moves gradually northwards, and by June and July the centre of great

heat is over the Punjab—at this season one of the hottest areas of the world (Fig. 425). The low-pressure centre thus formed over north-west India results in the monsoon. As shown in Fig. 426 the actual direction of the winds is controlled by the physical features of the country. The monsoon “breaks” at different times in different parts of India; the middle of June may be taken as an average date.

As already explained in Chapter IV (p. 46), it is customary to distinguish three seasons in India—the Cool Season (dry), from

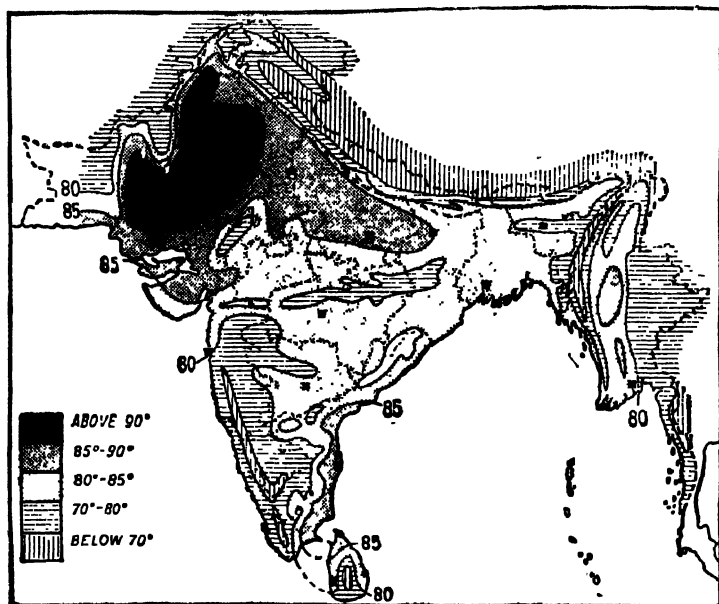


FIG. 425.—Temperature map of India for July.

A small area has been left blank near the east coast. How should it be shaded, and why?

November to January; the Hot Season (dry), from February to early June; and the Rainy Season, from June to October.

Rainfall and Natural Vegetation (see also p. 47).—India receives most of its rain from the South-West Monsoon, and hence the rain falls from June to October. Fig. 427 is a simple rainfall map of India and demonstrates the separation of four rainfall-vegetation regions:

(a) Areas with more than 80 inches of rain per year—in the plains rice is everywhere the leading crop, whilst the hills are clothed with evergreen forest of equatorial type.

(b) Areas with between 40 and 80 inches of rain—areas where the deciduous monsoon forests with the valuable teak and sal flourish, the trees losing their leaves in the hot, dry season.

In the plains many crops can be grown without irrigation and there is a mixture of wet-zone and dry-zone crops.

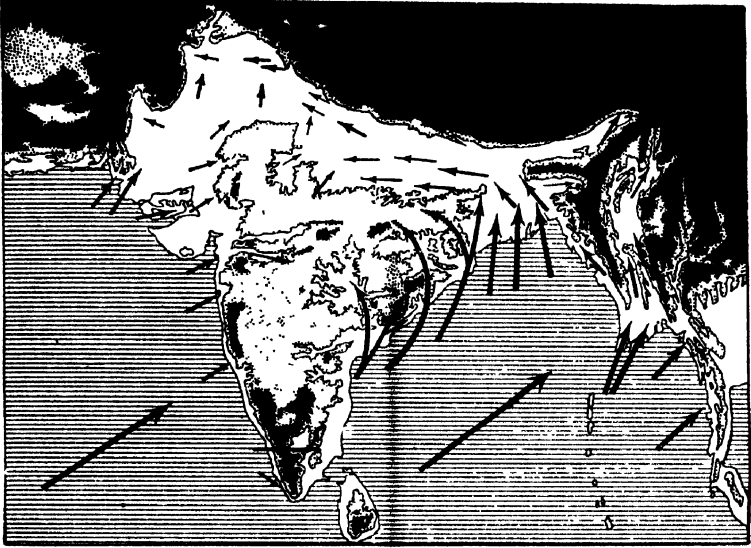


FIG. 426.—Map of India showing monsoon arrows.

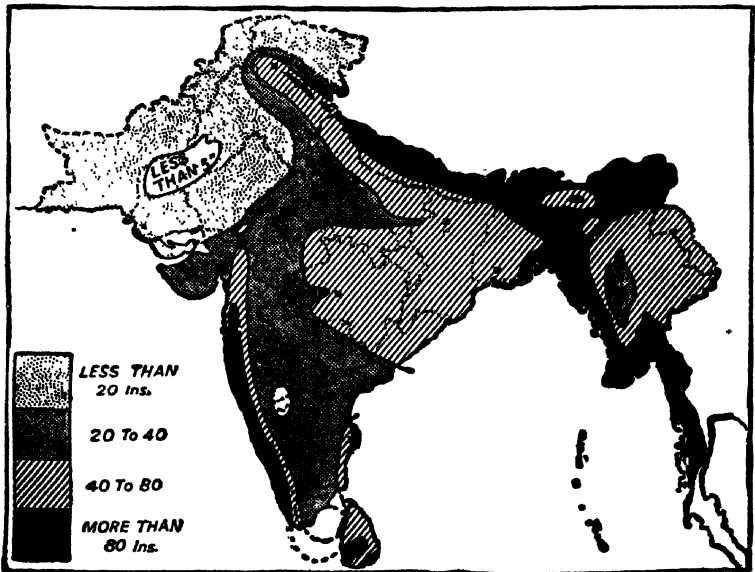


FIG. 427.—Rainfall map of India for the year.

In the centre of Peninsular India a small patch has been left blank. How should it be shaded, and why?

(c) Areas with between 20 and 40 inches of rain, where the natural vegetation is scrub and thorn forest, and where dry-zone crops, such as millets, grow.

(d) Areas with less than 20 inches of rain, forming deserts and semi-deserts and where irrigation is practically essential.

In addition to these four main types of vegetation, the remarkable differences between which are mainly due to variations in rainfall, there are the mountain forests which occur above the frost line (about 5,000 feet in Southern India, 3,000 feet in the Himalayas) which include both broad-leaved evergreen oak forests and coniferous forests. Mangrove swamps grow along those portions of the flat, muddy sea coasts and over the great river deltas which are flooded by the tides—especially round the old mouths of the Ganges where they form the “sundarbans.” Patches of grassland interrupt the monsoon forests on the hills, and much of the open thorn forest has a carpet of grass, but otherwise grassland is not characteristic of India. It must be remembered that India is a very densely populated country and the natural vegetation has been almost entirely removed over such fertile tracts as the alluvial plains of Northern India.

Forests and Forestry.—Nearly a quarter of a million square miles of land—about 15 per cent. of the total area of India—are classed as forests and out of this total over 100,000 square miles are “Reserved Forests,” the exploitation of which is carefully regulated by Government. Over half the forests of the Indian Empire and nearly a third of the Reserved Forests are in the province of Burma. The Central Provinces, the eastern and western slopes of the Western Ghats in Bombay and Madras, and the slopes of the Himalayas are the other important forested areas. The most valuable timber is teak, mainly from Burma; the pyingado or Burma ironwood is largely used for railway sleepers. The sal is a good timber tree of the north-eastern plateau and lower slopes of the Himalayas. The pine forests and the deodars of the Himalayas yield good timber but the forests are difficult of access.

Many of the poorer kinds of wood in all parts of India are used for firewood. The mangrove forests are found in deltas where no other wood is available, and are therefore valuable for fuel.

Bamboo is really a very large grass which grows in many parts of India, but especially in the Monsoon Forests, and has a great variety of uses. Another forest product is lac, a sticky substance produced by insects living in the forest trees.

The method of working the timber of the forests is interesting. It is cut in the dry season and dragged to the small streams by elephants or buffaloes. When the rains come the streams rise, and the logs are floated down to the bigger rivers. These logs are joined together to form “rafts” and floated down the rivers to saw-mills.

Agriculture.—India is essentially an agricultural country. Nine-tenths of the vast population depend on agricultural pursuits for their existence. Despite the population of 353,000,000 there is still a surplus of food grains available for export—wheat from the Punjab, rice from Burma though not from India proper.

The following table shows the relative importance of the chief crops (including Burma) :

Crop	Acreage (millions)		Yield (millions of metric tons)	
	1923-26	1930-31	1923-26	1930-31
Rice	80.7	82.0	29.7	31.6
Wheat	31.2	32.0	9.1	9.2
Millet	44.0	—	7.8	—
Sugar cane	2.7	2.8	2.9	3.2
Linseed	3.7	3.0	0.5	0.4
Rape and mustard	6.1	6.5	1.1	1.0
Sesamum	5.1	5.6	0.4	0.5
Ground nuts	3.2	6.2	1.5	3.0
Cotton	26.5	23.6	1.3	1.0
Jute	2.9	3.5	8.5	11.2
Tea	0.7	0.8	372.0 ¹	432.0 ¹
Coffee	0.14	0.16	25.0 ¹	39.5 ¹
Rubber	0.13	0.17	18.0 ¹	28.0 ¹
Indigo	0.14	0.06	30 ²	13 ²

The total acreage actually sown in British India (*i.e.* India excluding native states) was 228,000,000 acres in 1930-31, out of which 59,500,000 acres were irrigated. Sixty per cent. of the land irrigated is by Government works.

Rice is grown mainly on flat, alluvial land where there is an abundant rainfall. Its distribution is shown in Fig. 428. This should be compared with the rainfall and physical maps. It forms the staple food of the people in the wetter regions of India. In the drier regions it becomes less important, and where the rainfall is less than 40 inches it can only be grown on irrigated land.

Wheat, which forms the principal food grain of most white races, has become the favourite food in the drier parts of Northern India. It is there a winter crop, so that the land can often be used for other purposes during the rest of the year. It is sown at the end of the rains, and ripens at the end of the year before the great heat commences. In normal years a surplus is available for export to Europe *via* Karachi. The pre-war export disappeared during the war and post-war years, but has again assumed considerable proportions. Wheat is a very important crop in the Punjab and many of the northern parts of India. It is grown mainly on irrigated land

¹ millions of lbs.

² cwt.s. of dye (1,000).

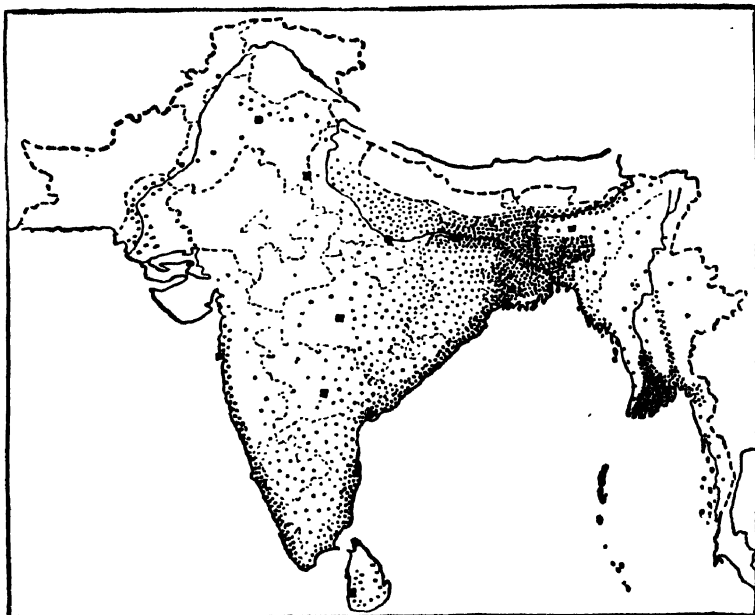


FIG. 428.—The distribution of rice in India.

Each dot represents 50,000 acres. Compare this with the rainfall, physical and geological maps.

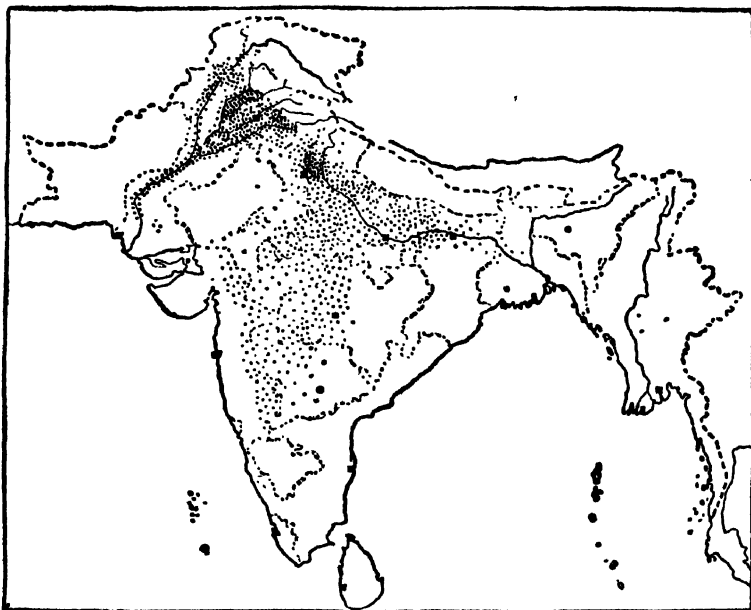


FIG. 429.—The distribution of wheat in India.

where the rainfall is less than 40 inches. As we travel down the Ganges Valley into wetter regions it gradually disappears.

Barley.—Barley is another important crop which grows largely in the same districts as wheat.

Millet forms the "staple" food of the people in most of the drier parts of India. There are several different kinds, the three principal being *cholum* or *jowar*, *cumbu* or *bajra*, and *ragi* or *marua*. Where the rainfall is less than 40 inches millet is everywhere important, and it can be grown without irrigation even when the rainfall is as low as 20 inches. When the rainfall exceeds 40 inches it quickly disappears. Fig. 430 shows the distribution of millet.

Maize flourishes both on the plains and in the hills where the rainfall is moderate. It is grown as a subsidiary food grain and for fodder in many parts of India but only among certain hill tribes is it the chief grain. We find it with millet in dry regions, but also in damper regions too. But in the Lower Ganges Valley with a rainfall of 60 inches it disappears.

Pulses of many different kinds are cultivated throughout the country. The most important is gram, which affords a good food as well as fodder for cattle and horses.

Sugar-cane is grown in nearly all the provinces of India, but most comes from the irrigated lands of the Upper Ganges Valley and the Punjab. From it jaggery (or jagri) the native brown sugar is made. Recently much more sugar has been made in India and the former large import from Java has ceased.

Cotton is the most important of the crops not grown for food. In India there are two principal kinds :

- (a) Native Indian short-stapled cotton.
- (b) American upland cotton.

Cotton is a dry-region crop, and flourishes where the rainfall is less than 40 inches. The soil is important; one of the best for native cottons but not for American is the sticky black cotton soil produced by the weathering of the Deccan lavas. The American cottons are grown mainly on irrigated alluvial soil in the Punjab and United Provinces.

Jute is a crop of which India enjoys almost a world monopoly. In India its cultivation is restricted almost entirely to the very wet lands of the Ganges Delta.

Oilseeds.—Plants grown for the sake of the oil obtained from their seeds include linseed, rape, mustard, sesamum, and ground-nuts. They grow best with a light or medium rainfall, and often prefer slightly hilly country. Ground-nuts, in particular, favour light sandy soils of little use for other crops. A good proportion of the crop is grown for export.

Coconuts grow best in wet regions along the coast and are grown

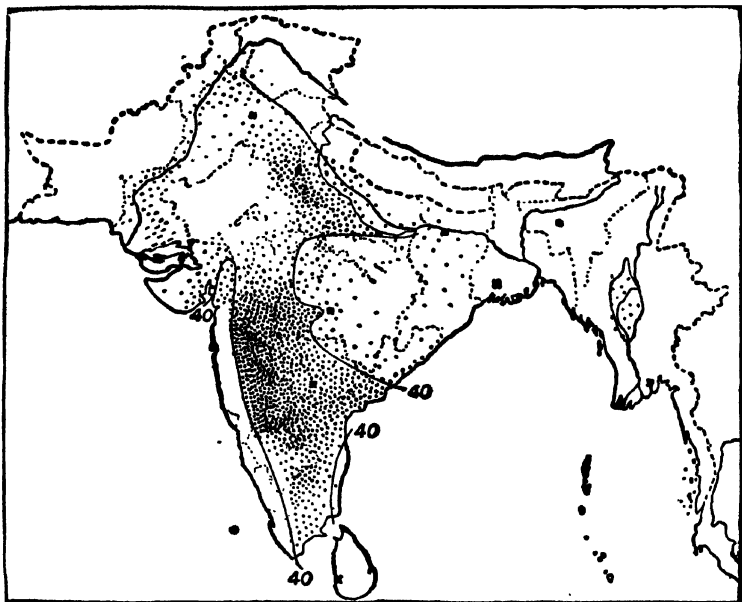


FIG. 430.—The distribution of millet in India.

Each dot represents 50,000 acres. Notice that nearly all the millet grows where the rainfall is less than 40 inches.

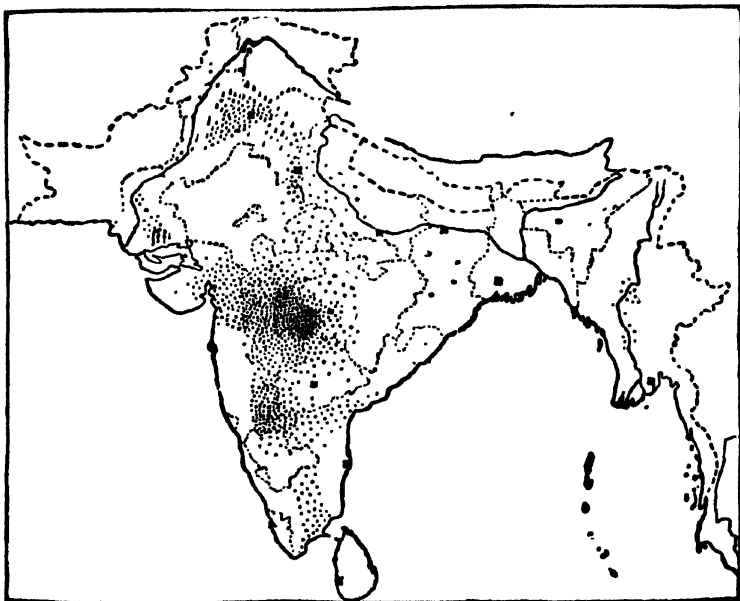


FIG. 431.—The distribution of cotton in India.

Each dot represents 20,000 acres.

down the west coast, in the island of Ceylon, in the Nicobar and other islands of the Indian Ocean, and on parts of the east coast.

Tea.—The tea-plant is a shrub which requires a heavy rainfall, but must be grown on hill slopes or where the water does not remain near the roots. Most of the tea is grown for export. The hill slopes bordering the Brahmaputra Valley in Assam, the Himalayan slopes near Darjeeling and Dehra Dun, the island of Ceylon, and the slopes of the Nilgiri Hills are the chief centres. Tea is obtained from the dried leaves of the shrub.

Coffee was once important in several districts in Southern India as well as in Ceylon. Disease ruined the industry and foreign competition, mainly South American, has prevented a resuscitation of the industry, except in Mysore.

Tobacco.—Soil is often more important for tobacco than rainfall, and a little is grown in most districts of India. In some places, like the delta of the Irrawaddy, enough is grown to be exported.

Rubber.—There are numerous rubber plantations in Ceylon, and some in Lower Burma and Travancore.

Indigo is a small plant from which a purple dye is made. It used to be important in the Ganges Valley, but the advent of cheap coal-tar dyes practically killed the industry, and the growing of indigo is not nearly so important as it was.

Opium is obtained from the seed-capsules of the opium poppy, and large quantities used to be sold to China. The Indian Government, for the benefit of humanity, has suppressed this lucrative trade, and only a little for medicinal purposes is now grown and exported.

Animals.—The numbers of animals in British India (excluding native states) without Baluchistan are :

	Millions	
	1924-25	1929-30
Oxen	120.3	123.0
Buffaloes	30.6	31.6
Sheep	23.2	25.5
Goats	39.2	35.9
Horses and ponies	1.7	1.7
Mules	0.07	0.07
Donkeys	1.4	1.4
Camels	0.5	0.5

Animals play an extraordinarily important part in the life of an agricultural country such as India. Oxen and buffaloes are used almost exclusively for ploughing and, except in the towns, are the principal draught animals. The horses and ponies are numerous

in the towns; ponies and donkeys are much used in hilly regions; camels and donkeys in the drier areas. An important animal not mentioned in the list above is the *elephant*, used especially in timber working and as a beast of burden in forested country. Large numbers of wild elephants still live in the less accessible parts of the monsoon forests and every year many are caught and trained, especially in Burma. They are driven into a strong wooden enclosure called a keddah. The keddah is very narrow and the elephant cannot turn round and so charges the end till tired out. The beast is then chained to a tame elephant for training purposes. Contrary to the usual belief, the elephant is a very delicate animal and requires careful attention.

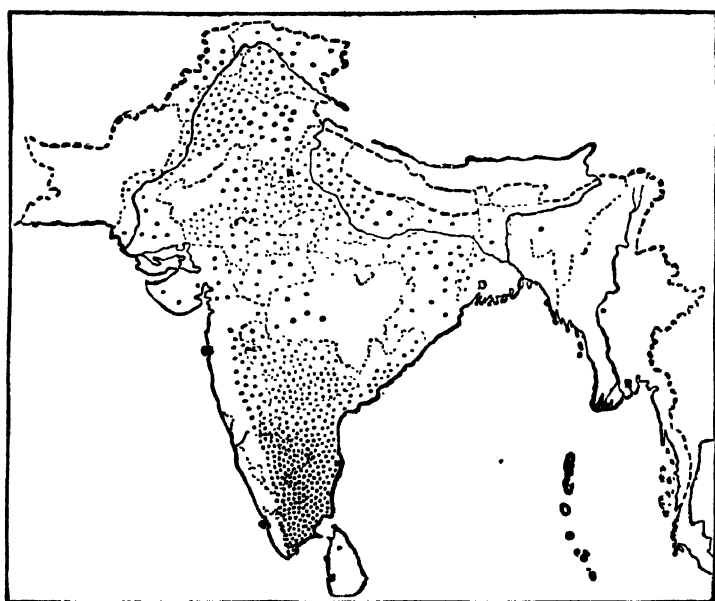


FIG. 432.—The distribution of sheep in India.

Each dot represents 50,000 sheep.

Oxen.—The enormous numbers of oxen in India—in the whole Indian Empire there are probably 160,000,000 or one for every two inhabitants—are the outcome of their use in ploughing. A pair of bullocks is the vital possession of every farmer working on his own, and in some parts of India the necessary qualification of a bridegroom—the argument being that without them he could not support himself and his bride. The cow is a sacred animal to the Hindus and so is not used as food and, moreover, the animals are allowed extraordinary liberty in wandering about—and incidentally polluting—villages, towns, and private dwellings. The manure when dried supplies fuel, but the Indian has not learnt to make full use of the

animals. The milk is often untouched; of the carcase the hide is often the most valuable part. Dairying has been established only in a few scattered areas, mainly in the United Provinces. In many of the drier parts of India there is not sufficient grass to feed the oxen, so fodder has to be grown for them.

Buffaloes.—There are 32,000,000 buffaloes in British India. The buffalo is heavier and stronger than the ox, but slower. Although the buffalo is very fond of the water, whence the name "water buffalo," and is much used in the rice fields of Lower Burma for ploughing, we also find large numbers in the drier parts of India, as in the United Provinces.

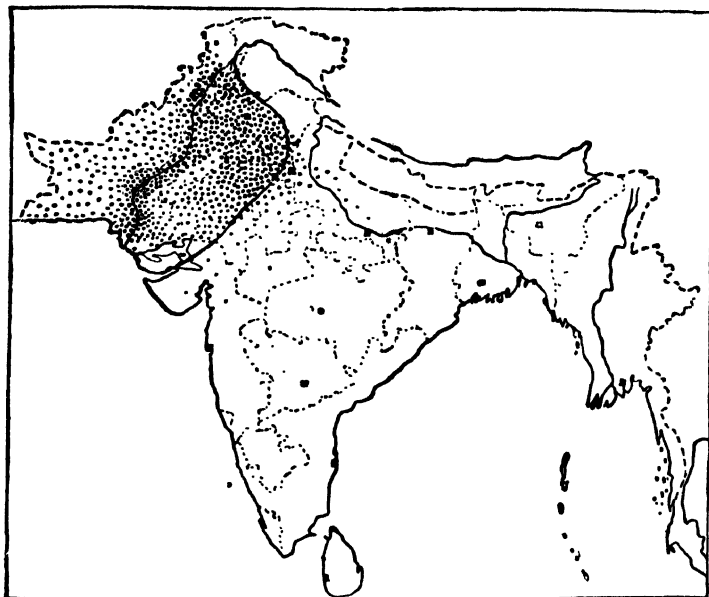


FIG. 433.—The distribution of camels in India.

Each dot represents 1,000 camels. The line marked is the 20-inch rainfall line. Notice how nearly all the camels live where the rainfall is less than 20 inches a year.

Sheep.—There are 25,500,000 sheep in British India, mainly in the dry hilly parts, where they can live on grassland or waste land which is not good enough for cattle. They are most abundant in Madras. Compared with the sheep of other parts of the world, those of India are very poor and yield neither good wool nor good meat.

Goats.—Goats are to be found everywhere in India, for they are very easy to keep. They can live on the poorest of grass or shrubs, and find enough to eat even in the driest parts.

Horses and Ponies.—There are less than two million horses and

ponies in India, which shows that horses are not used for ploughing as they are in other countries of the world.

Camels.—The distribution of camels in India affords an interesting example of climatic control—very evident from Fig. 433

Irrigation in India.—In times past India has suffered terribly from famine. The “famine areas” are for the most part those with a moderate rainfall, where in normal years the rainfall is quite sufficient to produce excellent harvests of “dry” crops—crops grown without permanent irrigation. The drier parts of the plateau suffer most from years of deficient rainfall, and in the old days many thousands of people perished. The advent of railways and efficient

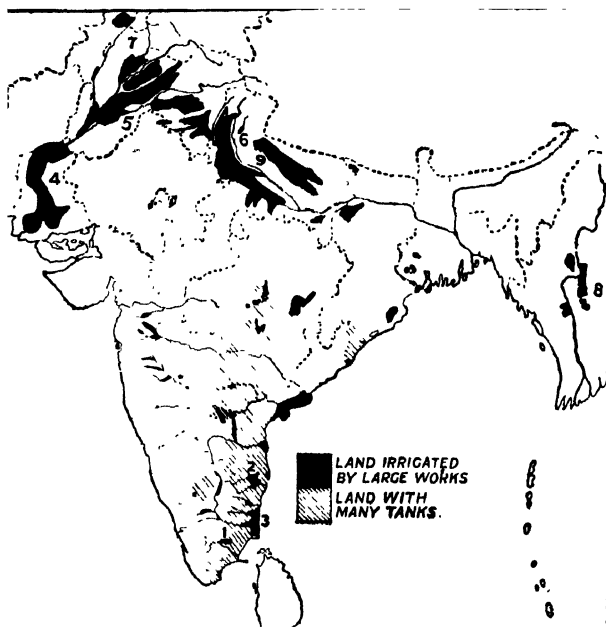


FIG. 434.—Irrigation in India.

organization in the despatch of supplies to the threatened area have rendered decimation by starvation almost a thing of the past. It is to be noted that famine is not to be feared so much in the *driest* parts where there are permanent irrigation works, but in regions of intermediate rainfall. The huge area of India irrigated has already been noted—ten times the total area of cultivated land in the most famous of all irrigated countries, Egypt.

Perennial Canal Irrigation is by far the most important type. The British Government has spent £100,000,000 on irrigation works in India, mainly in the drier parts of the great Plain—in the Punjab, United Provinces, and Sind. Although the rainfall in these parts

of the plain is poor, there is a never-failing supply of water in the rain-fed and snow-fed rivers from the Himalayas. Irrigation has transformed the Punjab into one of the leading provinces of India. It has been said, with but mild exaggeration, that "India adds an Egypt to its area every year, yet the world takes but little notice." There are also important systems in Madras and Central Burma.

Inundation Canals fed by the river during flood season, have been very important in the past especially in Sind, but they are being replaced by permanent canals. They have the double disadvantage that just in those seasons when water is most needed they are liable to be but partly filled; they cannot take full advantage of the river supplies, and dry up in the Hot Season.

Tanks.—In most of the drier parts of Peninsular India mud walls are built across the valleys of small streams, so that water collects and forms a pond or lake during the wet season. Such ponds or lakes are called tanks. When the rainy season is over, the water from the tanks can be used, but in the hot season the tanks dry up completely. In bad rainfall years the tanks may not even be filled during the rains.

Wells.—Although the surface of the land may be dry in the drier regions, there is often water at a short distance below the surface. This water can be reached by wells and brought up to the surface. In the north-eastern parts of the United Provinces, not yet served by canals, wells are very important.

Karez.—In Baluchistan, but in no other part of India, there is a very clever system of irrigation. The rainfall on the hills is greater than on the plains, and when the little streams from the hills reach the plains, the water sinks into the ground. Long underground tunnels called karez have been constructed to reach this water at the foot of the hills and to bring it out on to the alluvial plains.

The Political Divisions of India.—The Indian Empire is ruled by the Government of India, at the head of which is the Viceroy or Governor-General. The Viceroy is assisted by a small council, so that the acts of the Government of India are always said to be by order of "The Governor-General in Council." The Viceroy and Council are advised in all matters, but especially in the making of laws, by the Legislative Assembly, a large body of men mainly elected by the people themselves in all parts of the country. Although the Government of India with its Council and Legislative Assembly is the real means of Government in India, many matters have to be referred to London, where they are administered by the Secretary of State for India. When the possessions of the East India Company were taken over and the Government of India was formed, the proclamation declared that "all shall alike enjoy the equal and impartial protection of the law" whatever their race or religion, and that all offices in the Government should be open to

all natives of India, whatever their race or creed. Education, ability, and integrity are the only qualifications required for Government service.

Since 1912 the seat of Government or Capital of India has been Delhi. For many years before that it was at Calcutta, which remains the "commercial capital" of the country.

The fundamental division of India is into "British India" under the direct control of the Government of India, and the Native States. Many, in fact most, of the statistics published refer to British India, and this point should be carefully noted. British India has a total area of nearly 1,100,000 square miles, and a popula-

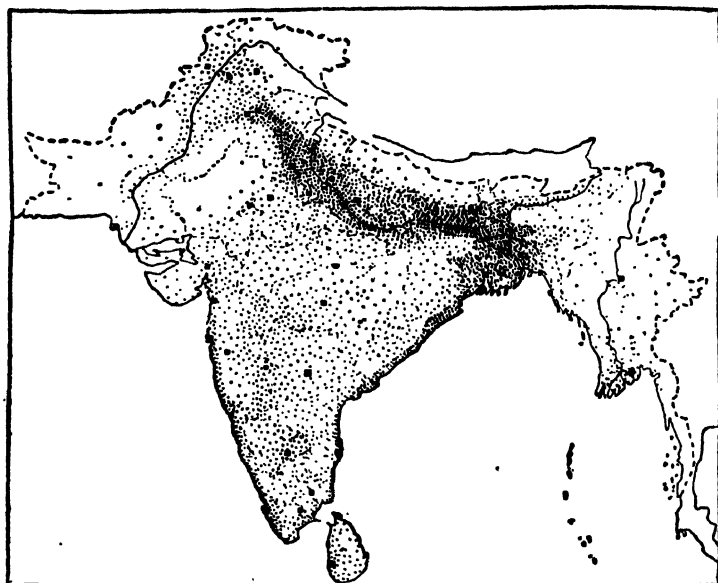


FIG. 435.—The population of India.

Each dot represents 100,000 people. Each square dot represents a town with more than 100,000 people.

tion (1921 census) of 247,000,000; the Native States cover over 700,000 square miles and have a population of 72,000,000.

Under the Government of India Act, 1935, Burma (formerly a province of British India) has now been separated from India. British India is now divided into eleven major or "Governor's" provinces and five minor. The eleven major provinces of Madras, Bombay, Bengal, the United Provinces, the Punjab, Sind, Bihar, Orissa, Assam, the Central Provinces, and the North-West Frontier Province are ruled each by a Governor assisted by a Legislative Council (elected mainly by the people); the five minor provinces are each administered by a Chief Commissioner. The five minor provinces are Ajmer, Delhi, Coorg, Baluchistan, and the Andaman Islands.

The Native States are ruled by their own chiefs, styled Maharajahs, Rajahs, etc. Generally the ruler is advised by a political officer appointed by the Government of India, but the native ruler otherwise has complete control of his affairs. Some of the Native States are very large (like Hyderabad or Mysore) others embrace only a few square miles. The smaller Native States have political relationships with the provinces within which they lie, but the larger States (Kashmir, Hyderabad, Mysore, etc.) deal directly with the seat of Government at Delhi.

Included geographically in India are certain entirely independent States like Nepal. Ceylon is entirely separate from India in matters of Government.

The following table gives the area and population of the leading provinces and states only :

Provinces	Area square miles	Population	
		1921	1931
Assam	53,000	7,600,000	9,250,000
Baluchistan	54,000	420,000	460,000
Bengal	77,000	47,000,000	51,000,000
Bihar and Orissa	83,000	34,000,000	38,000,000
Bombay Presidency	124,000	19,500,000	21,000,000
Burma	234,000	13,200,000	14,700,000
Central Provinces	100,000	14,000,000	15,500,000
Madras	142,000	42,000,000	47,000,000
N.-W.F.P.	13,400	2,250,000	2,400,000
Punjab	100,000	21,000,000	24,000,000
United Provinces	107,000	45,000,000	48,000,000
States			
Baluchistan States	80,000	400,000	400,000
Baroda	8,100	2,130,000	2,440,000
Bihar and Orissa States	29,000	4,000,000	4,600,000
Bombay States	63,500	7,400,000	8,000,000
Central India	51,500	6,000,000	6,600,000
Central Provinces States	31,000	2,000,000	2,500,000
Gwalior	26,400	3,200,000	3,500,000
Hyderabad	83,000	12,500,000	14,400,000
Kashmir	84,000	3,300,000	3,650,000
Madras States	10,700	5,500,000	6,000,000
Mysore	29,500	6,000,000	6,600,000
N.-W.F.P. States	25,500	2,800,000	2,300,000
Punjab States	37,000	4,400,000	4,500,000
Rajputana	129,000	10,000,000	11,200,000
Sikkim	2,800	82,000	110,000
U.P. States	6,000	1,130,000	1,150,000

Population.—In the whole of India, including Burma, there are 353,000,000 (three hundred and fifty-three million) people.

Fig. 435 is a population map of India on which each dot represents 100,000 people. By comparing this map with the physical,

geological, and rainfall maps we find that the population is densest :

- (1) In the lowlands or slightly hilly regions ;
- (2) On the tracts of alluvium ;
- (3) In both dry and wet districts.

Compared with its size there are very few large towns in India. The population is mainly "rural." India is an agricultural country ; the population is densest where agriculture is most important.

The Races of People in India.—The distribution of the different races of people in India is a result of the complicated history of the country. The original inhabitants are believed to be the "Pre-Dravidians." Then India was invaded by the Dravidians, who spread all over the country and drove the aborigines away to the hills and thick forests. There are scarcely any descendants of the Pre-Dravidians left now ; the best example is the Veddas, who live in the forests in the wildest parts of Ceylon. After the Dravidians, India was invaded again and again from the north-west by clever, cultured, and educated peoples. The invaders—we may call them all together the Indo-Europeans or Indo-Aryan peoples—took possession of all the best lands, such as the fertile plain of Hindustan, and drove the Dravidians into Peninsular India, south of the Satpura line. The Satpura range of mountains formed one of the great barriers which prevented the spread of the invaders to the south. Wave after wave of different races poured into India and settled there, often intermarrying with the people they conquered, so that to-day the peoples of India are all very mixed, and it is often difficult to say whether they have descended from the Dravidians or the later invaders. It is much easier to classify the peoples according to the language they speak, or according to their religion. Just as India was invaded again and again from the north-west, so Burma was invaded again and again from the north. But the people who poured into Burma were quite different from those who went to India. Burma was invaded by Mongol peoples—that is, people like the Chinese with yellowish or yellowish-brown skin, smooth broad faces, and straight black hair. Nearly all the people living in Burma are Mongols. As in India, the wilder peoples were driven away to the hills, and one of the latest and cleverest invaders (the Burmans) seized the most fertile lands of the river valleys.

The Languages of India.—The large number of languages spoken in India is also a result of the history of the country. In northern India, Hindustani, and in Southern India, Tamil, are the two native languages most widely used or understood, though English is the commercial language understood by educated Indians throughout the country. It must be remembered that most of the

lower classes—indeed no less than 93 per cent. of the total population—are illiterate, unable to read and write any language.

Religion.—More important than race, or even language, is religion. In India the lives of the people are often entirely controlled by religion. It determines their upbringing, education, customs, and habits, marriage, occupation, dwelling-place, type of home, and the architecture of their towns. One or two examples may be of interest. To the Hindu the cow is a sacred animal; the animals are not killed even if useless, and numbers of sacred bulls do no work; the Hindus will not eat beef. To the Mahommedans the pig is an unclean animal, and they will not eat pork. It is forbidden for a Buddhist to take life, and he will not kill an animal for food. Early marriage is the custom among certain Hindus, and nearly all the girls are married before they are ten years old in certain parts of India. The strict observance of the “purdah” system, whereby a woman may not be seen by men other than her husband, has resulted in types of huts and walled yards which simplify this observance; in some parts the huts are scattered amongst the fields instead of being collected into villages.

We find in India that there are “religious centres”—famous places of pilgrimage or seats of learning connected with one of the religions. Thus Benares with its thousands of Hindu temples and its Hindu colleges is a centre of both the Hindu religion and the culture connected with it. Lahore is a great centre of Mahommedanism, whilst Rangoon and Mandalay in Burma and Kandy in Ceylon are centres of Buddhism. To the Hindus the River Ganges is the most sacred river in the world; to die or to be cremated on its banks is to gain everlasting peace. Hardwar, where the Ganges leaves the mountains, is one of the most sacred places of pilgrimage.

The two greatest religions of all—Hinduism, which may be called the national religion of India, and Mahommedanism—are widely distributed. Mahommedanism came to India with the later invaders from the north-west, and so we find it predominates in Baluchistan, North-West Frontier, Kashmir, and the Punjab. There is another strong centre of Mahommedanism in Bengal. Hinduism predominates in other parts of India. Christianity was brought by seafaring peoples, and is strongest near the coasts.

Manufactures.—Although India has always been an agricultural country, it has also been noted for the cleverness and skill of its people in handicrafts—making cloth and silk fabrics, working in metal, ivory and wood. But machine-made articles can be produced so much more cheaply than hand-made articles, and India is fast taking her place in the world as a manufacturing country as well as an agricultural country. We can still distinguish :

(a) The old native industries of hand-made articles.

(b) The newer factory industries of machine-made articles.

Cotton Goods.—The most important native industry has always been the weaving of cotton fabrics. Cotton is one of the native plants of India, and though enormous quantities are produced for export nearly half is used in the country. In some parts of India and Burma every house has its handloom where the women make saris for themselves or dhotis for their husbands. More important now are the great cotton factories. The most important cotton manufacturing centre is Bombay, where a quarter of a million people are employed in the cotton-mills. There are also mills in the Madras Presidency and in the Central Provinces. For the manufacture of cotton goods a certain amount of moisture in the air is required. Bombay has this right amount of moisture, Karachi has not. So that, although Bombay and Karachi are both ports exporting raw cotton, only Bombay has in addition cotton-mills.

AGRICULTURAL	INDUSTRY	TRADE	OTHERS
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FIG. 436.—Occupations in India.

Jute.—Just as Bombay is the centre of the cotton manufacturing industries, so Calcutta is the centre of the jute-mills, the raw material being produced in the Ganges Delta. A large quantity of jute is exported raw, but the mills round Calcutta and up the River Hooghly make large quantities of jute canvas and “gunny bags” or grain sacks.

Silk.—India has long been famous for its beautiful silks, and many of the fine old towns are still noted for special kinds. But the industry is very small when compared with cotton or jute. Much of the raw silk is imported from China, but native Indian silk is also produced. Bengal is the chief silk-producing province. Brocaded silk goods are made in Bengal, the Punjab, and Southern India; striped silks and the famous gold brocades all over Northern India at such centres as Agra, Benares, Amritsar, Ahmadabad, and Surat. Burmese silk, made near Mandalay, is quite different but is very good.

Woollen Goods.—India has also long been celebrated for woollen goods, especially carpets and shawls. The weaving of shawls is a typical industry of Kashmir. Carpet-making is carried on in many parts of India, but especially in the Punjab, Kashmir, and the Central Provinces. Coarse blankets are made in many parts of Northern India, where the winters are cold.

In the cotton, silk, and woollen industries native vegetable dyes such as indigo were formerly used, but now cheap artificial dyes are imported.

Metal Working.—Ironworking is another old industry of India, but the great Tata iron and steel works are the only large modern ironworks. Many castes in India use brass for all cooking utensils, and brass-working is an important industry in many towns of Northern India, such as Benares. Bombay and Poona are centres of silver-working; Jaipur and Delhi of gold-working.

Pottery.—The making of pottery for domestic purposes is a native or “cottage” industry all over India. Bricks and tiles are made all over Northern India.

Other Manufactures.—There are numerous rice-mills in Burma; wheat-flour mills in the Punjab; saw-mills in Assam and Burma; oil refineries in Burma, Assam, and the Punjab; tobacco factories in Madras, Burma, etc., as well as sugar-mills in various parts. In Southern India the rubber industry is important, and in Assam tea-packing.

The Cities and Towns of India.—Although nine persons out of every ten live in small villages or isolated huts, with a vast population of 353,000,000 people, there must be a number of large towns. We may distinguish :—

(a) The five great ports—Calcutta, Bombay, Karachi, Rangoon, and Madras.

(b) The famous old cities of the past, many of them founded thousands of years ago, and full of fine old buildings. Some, like the great capital of India, Delhi, are still flourishing; others are becoming smaller.

(c) Cities of modern growth, depending usually on manufactures or the presence of railways.

The Great Ports.—*Bombay* has a fine large natural harbour. Being built on an island there is great congestion in the town, for there is little room for expansion. Notice the gaps in the hills through which the railways from Bombay pass inland to its fertile hinterland. It is from the plateau region behind that Bombay gets most of the raw cotton for its numerous cotton-mills.

Calcutta is the largest city in India, and the second largest (after London) in the British Empire. A hundred years ago the site of Calcutta was an unhealthy swamp; it has grown to greatness by the labour of man and under the activities of the Government of India. Although 70 miles from the sea on the River Hooghly, it can be reached by large ocean steamers, and it is well situated to receive the products of a vast hinterland—the whole of the Ganges Valley. On the opposite side of the River Hooghly is Howrah, which really forms part of Calcutta, and which is connected by rail with nearly all parts of India.

Karachi is the third port of India. Although it has not a very good harbour (it is protected by a breakwater), it is the natural

outlet of the Punjab and is rapidly growing. Notice the railways from Karachi. It is the great wheat port of India, exporting the wheat of the Punjab and also large quantities of cotton. The climate is too dry for the establishment of cotton-mills such as exist at Bombay.

Rangoon is the capital and leading port of Burma. It is well situated 20 miles from the sea, between the Irrawaddy and Sittang rivers, and receives the products of nearly the whole country. The

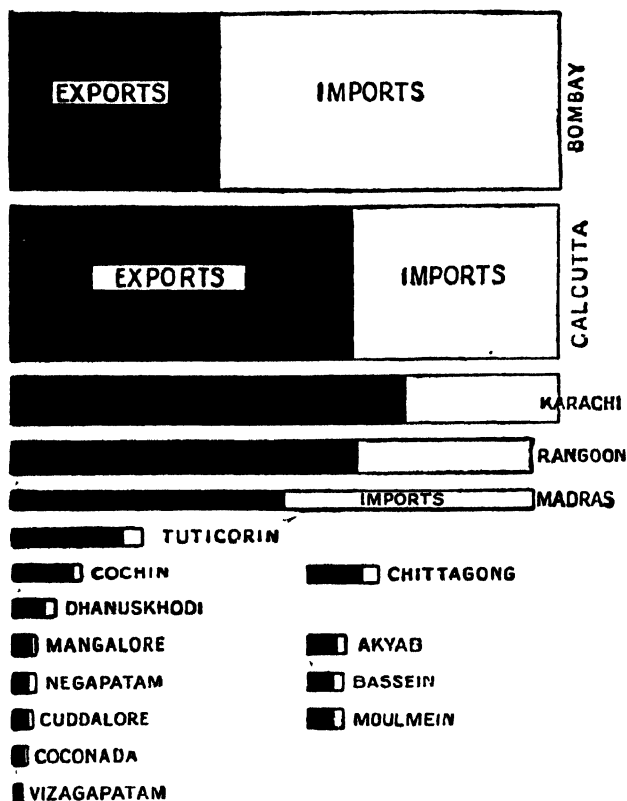


FIG. 437.—Trade of the principal ports of India (1924).

principal exports are rice (grown in the Irrawaddy Delta), petroleum (brought by pipe line from the oil fields), teak wood, and raw cotton.

Madras has the only good harbour on the east coast—it is entirely artificial. Madras is the third largest city and the fifth most important port in India. As a port its trade is a long way behind that of Karachi and Rangoon. There are cotton-mills in Madras, and both cotton goods and raw cotton are exported. The tanning of hides and export of leather also belong to Madras.

Inland Cities and Towns.—*Delhi*, the capital of India, lies

between the Punjab Plain and the Ganges Plain. The district around has been constituted a small province, separate from the Punjab and the United Provinces. Delhi is a large city of 450,000 inhabitants; it owes its importance largely to its position. From Delhi any place in the plain, either of the Ganges or Indus, is easily reached. In days gone by, when India was invaded from the north-west, the invaders had to pass near Delhi, because they were shut in by the Himalaya Mountains on the north and the desert on the south. In the old days the land routes of the north-west joined the water routes down the Jumna and Ganges. In modern days Delhi has become a railway centre. The cotton of the surrounding irrigated lands finds its way to the cotton-mills of Delhi. At a

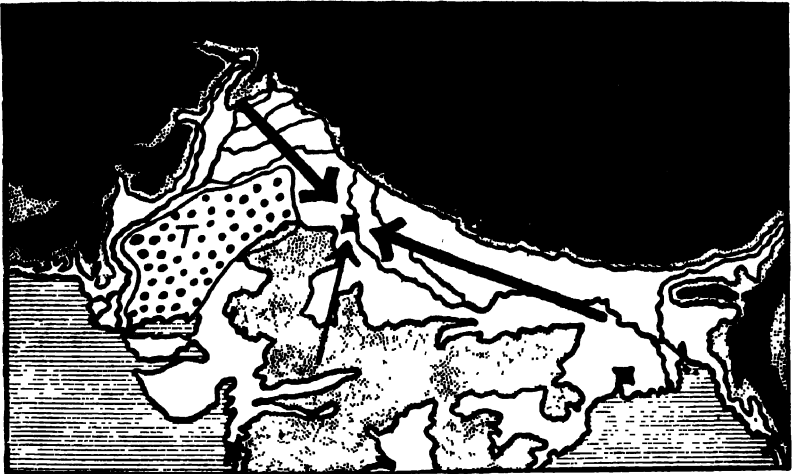


FIG. 438.—The position of Delhi.

T = the Thar Desert. Land over 1,000 feet, dotted; land over 3,000 feet, black.

convenient distance to the north are the healthy heights of the Himalayas, on a spur of which Simla has been built.

Starting from Delhi, we will review the more important places as one goes down the broad Ganges Valley towards Calcutta. On the river Jumna lies Agra, formerly one of the great cities of the Mogul Empire and famous for the Taj Mahal, perhaps the finest work of art in India. In the Ganges-Jumna Doab lie collecting and distributing centres, amongst which Aligarh is noteworthy as having a dairying industry. Cawnpore, on the Ganges, has become a railway centre and has developed modern factories. Lucknow has long been famous for its gold and silver ware. Allahabad, on the confluence of the Ganges and Jumna, is the provincial capital, a place of pilgrimage, a railway junction, and manufacturing town. Benares is the old seat of learning and the most sacred city of the

Hindus. Lying in Bihar and Orissa is Patna, which has given its name to a certain excellent quality rice. In Bengal there are now several large jute-mill towns on the Hooghly, north of Calcutta. On the border of Bengal and Bihar and Orissa are the coal-field centres such as Asansol. In the east of Bengal is the old city of Dacca, which is again flourishing. On the healthy heights of the Himalayas to the north of Bengal lies the hill station of Darjeeling.

Returning now to Delhi and going westwards into the Punjab

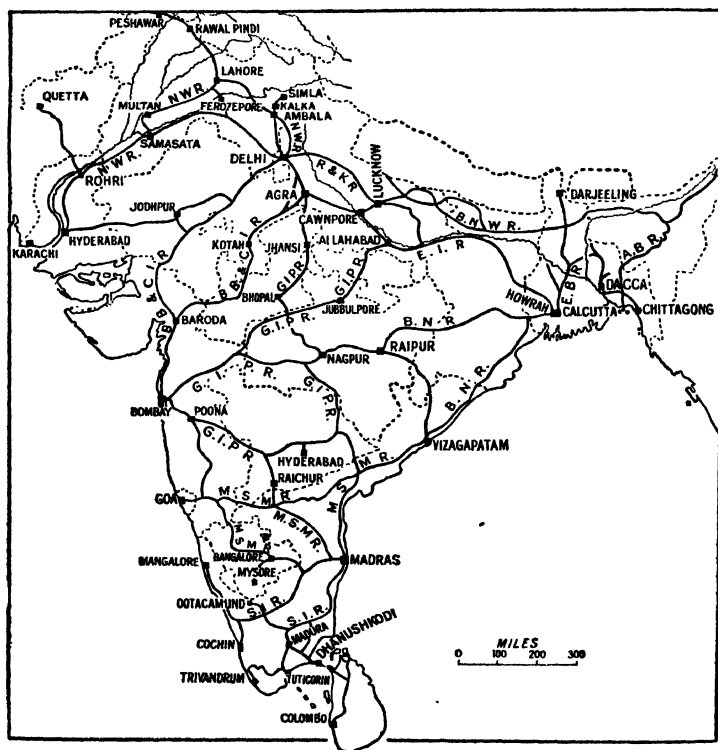


FIG. 439.—Railway map of India.

we find Lahore, the capital, is a flourishing city; but Amritsar is again growing. Rawalpindi guards the main route into Kashmir to the town of Srinagar. Peshawar guards the Khyber Pass route and is the centre of the irrigated Vale of Peshawar and principal city of the North-West Frontier Province. Multan is the central town for the very dry south-west Punjab. The fortress of Quetta guards the Bolan Pass.

In Peninsular India, Jubbulpore and Nagpur are two important centres, both with cotton-mills. Farther south, Hyderabad is the

¹ In the decade 1921-31, largely owing to influenza, many Indian cities decreased

chief town of the state of that name. Bangalore and Mysore are the chief towns of Mysore. In Madras, Ootacamund is the hill station for southern India. Trichinopoly and Madura are two old cities. Cochin on the west coast, and Vizagapatam¹ on the east, are both being provided with harbours at great cost.

Passing to Burma we note the position of the old capital of Mandalay in the heart of the country. Yenangyaung is the modern oil-field centre, Bassein the rice port of the western delta.

The Communications of India.—*Railways.*—By far the most important means of communication in India is the railway. India has now 42,000 miles of railway. There are two principal gauges :—

(a) The broad gauge, 5 feet 6 inches, including all the more important lines and more than half the railways of India.

(b) The metre gauge, 3 feet 3 $\frac{3}{8}$ inches, used mainly, but by no means entirely, for branch lines.

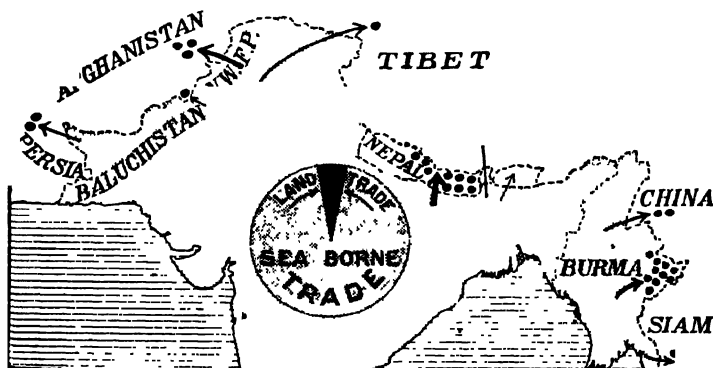


FIG. 440.—The overland trade of India.

Each dot represents trade to the value of roughly one crore of rupees.

Some of the hill railways are on a still smaller gauge. Most of the important railways of India run from the chief ports to different parts of their hinterlands, and it is simplest to study the railways by taking each of the great ports in turn. Follow these on the map, Fig. 439.

There are four main railways radiating from Calcutta and Howrah; four main lines radiate from Bombay; Karachi really has only one railway, which runs to Hyderabad. From Hyderabad there are two main lines, one to Delhi, the other up the Indus Valley to the Punjab. Four main lines radiate from Madras.

Apart from these main lines, shown on Fig. 439, there are large numbers of branch lines in all the more thickly populated parts of India. There is at present no railway connecting India and Burma,

¹ Finished in 1933.

and no railway connecting India with any other country except just over the border into Persia.

Roads.—When compared with other civilized countries, India has very few metalled roads. There are a few “trunk roads,”

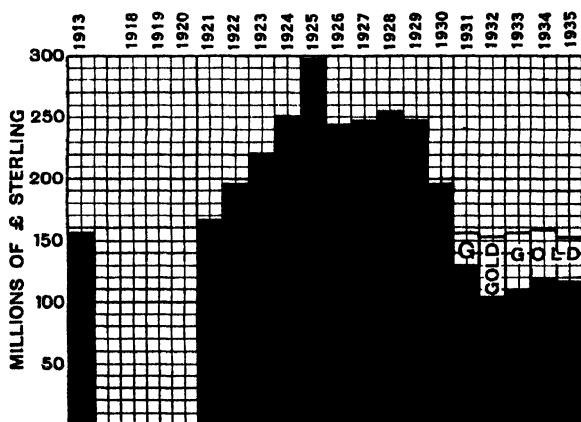


FIG. 441.—The exports of India—merchandise, bullion, and specie.

The apparent rise and fall in the trade is largely due to exchange variations, since conversion into sterling has been made at the average rate for the year. The rupee is now standardized at 1s. 6d. The trade, expressed in crores of rupees (1 crore = 10 million), is as follows:

1913	254 crores.	1925	410 crores.	1930	230 crores.
1921	265 "	1926	323 "	1931	196 "
1922	299 "	1927	318 5 "	1932	212 "
1923	346 "	1928	337 "	1933	147 "
1924	389 "	1929	320 "	1934	160 "

These figures are for calendar years, *not* the Indian financial year.

such as the one from Calcutta to Peshawar, which were commenced before the days of railways, but often even the trunk roads are badly in need of repair. Most of the metalled roads of India are found round the larger towns, or acting as “feeders” to the railways.

1921-25									
RAW MATERIALS AND FOODS					MANUFACTURES				
RAW COTTON	RICE	OIL SEEDS	TEA	RAW JUTE	VARIOUS	JUTE MANS.	COTTON MANS.	HIDES & LEATHER	
10	20	50	40	50	50	70	10	10	10
1927-8 TO 1931-2									
RAW MATERIALS AND FOODS					MANUFACTURES				
RAW COTTON	RICE	TEA	OIL SEEDS	RAW JUTE	VARIOUS	JUTE MANS.	COTTON MANS.	HIDES AND LEATHER	VARIOUS

FIG. 442.—The exports of India.

Rivers.—The rivers are much less important than formerly, owing to the growth of the railways and the use of river water for irrigation. The largest system of river transport is found on the Irrawaddy, in Burma, and on the River Ganges and branches below

Patna. Except for the Calcutta and Eastern Canals, the canals of India are little used for transport ; they are for irrigation.

The Foreign Trade of India.—Owing to the mountain wall which forms the landward frontier of India, most of her foreign trade is sea-borne. Fig. 440 shows the direction of the small land

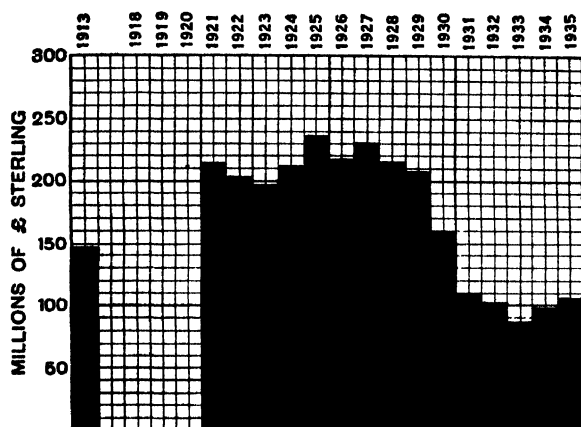


FIG. 443.—The imports of India (including gold and silver).

Expressed in crores of rupees (a crore = 10,000,000).

1913 238 crores.	1925 319 crores.	1930 200 crores	1935 139 crores.
1921 320 "	1926 280 "	1931 170 "	
1922 305 "	1927 308 "	1932 134 "	
1923 299 "	1928 297 "	1933 116 "	
1924 318 "	1929 275 "	1934 131 "	

trade. Although India has a large foreign trade—the exports were nearly £300,000,000 in 1925-26, and the imports £180,000,000—the trade is small when compared with the vast population of 353,000,000. Figs. 442 and 444 show the principal items of import

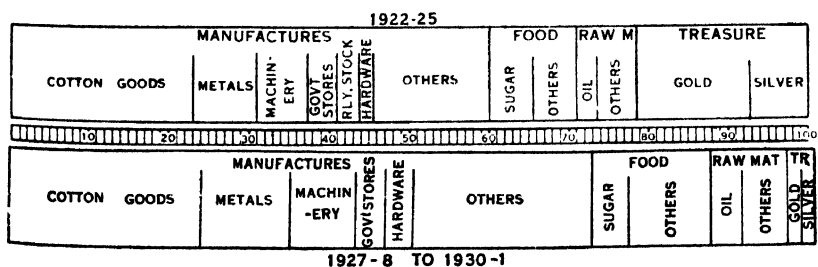


FIG. 444.—The imports of India.

and export. Amongst the imports the huge proportion of gold and silver is remarkable. The poorer classes in India have not yet learnt to appreciate and use savings banks, and what wealth they have is in the form of gold and silver ornaments. Much of the gold is from the Transvaal. In a hot country like India all the

clothing absolutely necessary can consist of cotton garments, hence the large import of cotton manufactures—mainly from England and Japan. It should be noticed that India formerly did not grow enough sugar for her requirements. Amongst the exports, the raw cotton is exported almost entirely from Bombay and Karachi (turn to Fig. 431 for an explanation of this); the jute and tea from Calcutta; the rice from Rangoon; the wheat from Karachi.

NOTE.—The rise in the price of gold, expressed in rupees, has led to an enormous export in 1931 and later years.

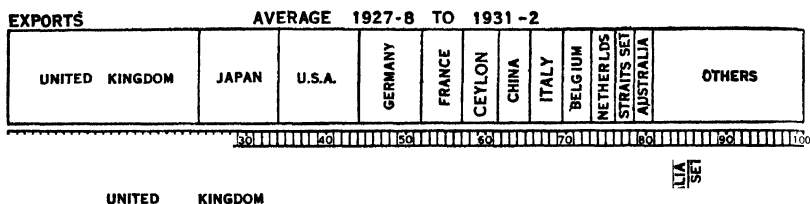


FIG. 445.—The direction of India's foreign trade.

THE PROVINCES AND STATES OF INDIA

ASSAM

Assam has been a separate province since 1912. Its population is only $7\frac{1}{2}$ millions, and there is still plenty of room for more people in many parts of Assam. The seat of Government is Shillong, situated on the high healthy plateau but not served by railway.

Physical Features.—Assam falls into three separate divisions:

- The Brahmaputra Valley along the north.
- The Hills Region, consisting of the hills which separate Assam from Burma, and sending a broad finger westwards to form the Khasi, Jaintia, and Garo Hills.
- The Surma Valley in the south, which joins on to, and really forms part of, the great Delta Region of Bengal.

Along the north of Assam lie the Himalaya Mountains, and certain tracts of Assam form part of the mountain regions.

The first two physical regions form natural regions which lie wholly within the province, and we will describe them in detail, but the Surma Valley will be described later with Bengal.

The Brahmaputra Valley in Assam is roughly 500 miles long, but only about 50 miles wide, and so is very different from the broad Ganges Plain. It is shut in between the lofty Himalayas on the north and the Assam Hills on the south. A great part of the valley has a rainfall of more than 80 inches, but in the centre there is a drier patch. This drier part lies in the rain-shadow of the Garo,

Khasi, and Jaintia Hills, which protect the valley from the south-west monsoon. In the hot season and the rains the sky is cloudy, and the land does not get so hot as in the broad Ganges Valley. The Brahmaputra River itself is broad; it divides and reunites again many times; on either side there is often a waste marshy belt, but a little distance from the river are flat lands given over to rice-growing. Palm trees and villages are dotted about amongst the paddy-fields; farther away from the river we find the gentle slopes covered with tea gardens for which Assam is famous. There are still only 150 people to the square mile in this region, instead of 500 as we find in the Ganges Valley. Less than a quarter of the region is cultivated, whilst nearly half is waste land. Every year Bengalis come from crowded Bengal to settle; Biharis are employed in the tea gardens, and afterwards settle on the land, and so the population is growing. Two-thirds of the cultivated land is used for rice; tea and oil-seeds are the other important crops. Twelve

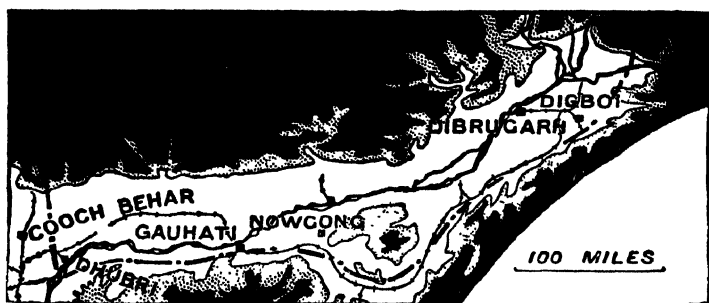


FIG. 446.—The Brahmaputra Valley.

people out of every hundred are connected with the tea industry. Remember that the tea is grown mainly for export. At the eastern end of the region is the small oil field of Digboi. The river is the great highway; notice how it interrupts the railways.

The Hills Region of Assam forms part of the mountain wall between India and Burma. The hills receive a very heavy rainfall, and on the southward slope of the Khasi Hills is Cherrapunji, one of the rainiest places in the world, with nearly 500 inches of rain per year. The most important part of the region is the plateau on which Shillong is situated, and here there is a moderate amount of cultivation. Taking the region as a whole, only one twenty-fifth is cultivated, more than half is waste, and forests cover one-eighth of the whole. Many of the forests are too difficult to reach to be of value, but good sal forests are found on the Garo Hills. The wilder parts of the region are inhabited by various hill tribes, but the more fertile parts of the Garo and Khasi Hills are being cultivated by settlers from Bihar and Bengal. There is a motor road from

Gauhati on the Brahmaputra to Shillong, and a cart road from Dimapur into Manipur State.

NEPAL

Although Nepal is a kingdom quite independent of India, we will consider it next, because it lies to the north of the Ganges Plain, and in Nepal we can learn something more about the mountain wall which guards India on the north. Nepal falls into two natural

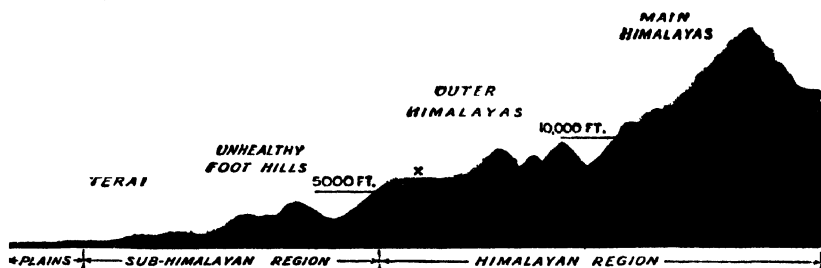


FIG. 447.—Section through the Himalayas.

regions, the Himalayan Region and the Sub-Himalayan or Sub-Montane region.

The **Himalayan Region** can be divided into four belts, according to vegetation and height above sea-level :

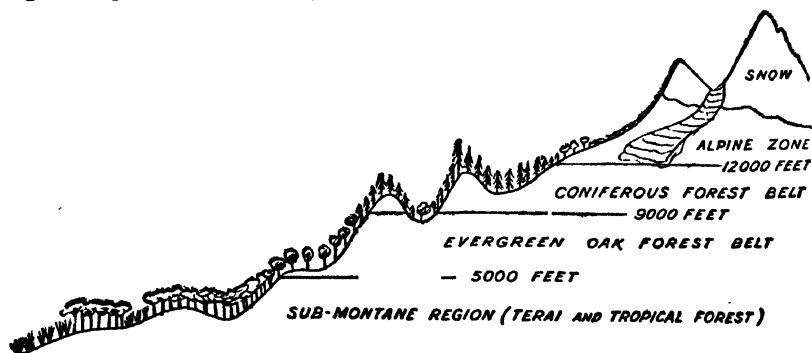


FIG. 448.—Vegetation zones of the Eastern Himalayas.

- (1) Evergreen Oak Forest Belt, 5,000 to 9,000 feet.
- (2) Coniferous Forest Belt, 9,000 to 11,000 feet.
- (3) Alpine Belt, 11,000 to 16,000 feet.
- (4) Snow, 16,000 feet to the top of the mountains.

Although the forests are dense and contain many different trees, they are too inaccessible to be of great commercial value at present.

The **Sub-Montane** or **Sub-Himalayan Region** lies between the broad cultivated plains of the Ganges and the Himalayan

Region, extending to a height of 5,000 feet in the Himalayas. It can usually be divided into two strips :

(a) The part nearer the plains, often built up of sand and stones washed down from the hills, is only slightly above the level of the plains. It is often covered with coarse tall grasses, and is known as the Terai.

(b) The part nearer the mountains consists of a belt of hills, usually covered with forest, damp and unhealthy. There are large areas of valuable sal forest.

Cultivation is gradually extending into the Terai, which is being drained, cultivated, and rendered more healthy, and so the population increases.

The principal town of Nepal, Katmandu, is situated in a rich valley amongst the hills. Nearly a quarter of all the inhabitants of Nepal live in this valley.

Nearly all the exports and imports of the kingdom of Nepal pass through India. More than one quarter of the whole of the foreign trade passing the land frontiers of India is with Nepal.

KASHMIR

Kashmir is a large native state, situated amongst the mountains of north-western India. It is ruled by the Maharaja of Kashmir and Jammu, whose capital is at Srinagar.

The greater part of Kashmir lies in the Himalayan region, but the whole country is much drier than Nepal. The north-eastern corner of the state lies on the Tibetan Plateau, whilst the south forms part of the Sub-Himalayan Region.

THE NORTH-WEST FRONTIER PROVINCE

The North-West Frontier Province is one of the smaller provinces of India, and lies mainly between the Punjab and the Afghan frontier on the western side of the Indus. It consists of three British Districts and a large tract of "tribal territory" lying between them and the frontier. The tribal territory is inhabited by wild hill tribes who are left to themselves unless they become restless and attempt to raid the people of the plain. The whole of the province forms part of a single natural region, which may be called the North-Western Dry Hills Region. Some of the adjoining districts of the Punjab belong to the same natural region.

The North-Western Dry Hills Region.—Everywhere the rainfall is small and nowhere exceeds 30 inches. The tract on the west of the Indus consists of a series of three plains—Peshawar, Bannu, and Dera Ismail Khan—divided from one another by the low hills of

Kohat and offshoots of the frontier range. The Indus Valley itself is a fine tract, but the harvests vary greatly with the extent of river floods. The Vale of Peshawar is highly irrigated and well wooded. Where irrigated the Bannu Plain is fertile, but elsewhere is dry and barren. The plain of Dera Ismail Khan is a clay desert, but in good rainfall years becomes grass covered. These plains have very hot summers and very cold winters. To the west of the three plains lie the barren treeless hills inhabited by the wild frontier tribes. In the more sheltered valleys are little villages, and near by the hill-slopes may have sufficient grass for sheep to be kept. The region is almost outside the influence of the monsoon and most of the scanty rain falls in the cold season. The irrigated plains of Peshawar and Bannu are thickly populated and much wheat is grown. Another crop is gram. Millet is grown as a dry crop.

Above Peshawar lies the famous Khyber Pass, the gateway to Afghanistan. A wonderful mountain railway now threads its way through the narrow pass. Peshawar is the most important town of the province, it is the centre of the irrigated land, and controls the Khyber Pass routes.

BALUCHISTAN

Baluchistan lies outside the mountain wall of India and outside the influence of the monsoon, and is a very dry plateau. It includes several British Districts (the most fertile parts), the large native state of Kalat and a number of smaller states. In this barren country there are only six people per square mile—less than in any other Province or State of India. The people are nearly all nomads moving about with their herds of sheep, goats, horses, cattle, and camels. In summer they live in shelters made of branches, or in tents made of goats' hair matting. In winter they live in mud huts in villages. A little land is irrigated by the curious "Karez" or by flood waters from the rivers. The principal crops are millet, wheat, and fodder. Along the sea-coast there are a few fishermen, but a little way away from the coast dates provide food for man and beast for most of the year. There are really no towns in Baluchistan. The Bolan Pass is the easiest route from Baluchistan to India, and the British town of Quetta lies at the head of the pass. Another British station is Sibi. Across the deserts are numbers of old camel caravan routes. One of these, running along the north of the country to the Persian border, has now been replaced by a railway.

THE PUNJAB

Although it lies in the dry north-west, the Punjab is one of the important provinces of India. It has benefited enormously by the great irrigation works carried out by the Government. Punjab

means "five waters" and the Punjab is, strictly, the land of the five rivers—the Jhelum, Chenab, Ravi, Bias, and Sutlej. But the province which extends beyond this area, includes the land between the Jhelum and the Indus, as well as part of the land between the Sutlej and the Jumna and part of the Himalayas. Included in the province are several native states.

The greater part, including the most important lands, of the Punjab forms part of the great plain of Hindustan and will be described under the name of the Punjab Plain. In the north-west is a dry plateau or hilly region which forms a part of the North-West Dry Hills Region. The most important crop is millet, which depends mainly on the scanty rainfall. There is an oil field near Attock, and salt is mined in the Salt Range. The principal town is

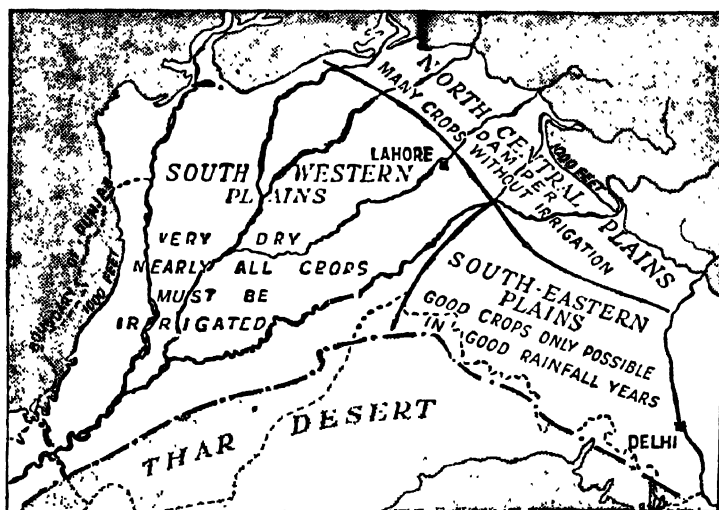


FIG. 449.—The three divisions of the Punjab Plain.

Rawalpindi, at the foot of the Himalayas, from which a road runs to the hill station of Murree and to the heart of Kashmir. The north-eastern part of the Punjab includes portions of the Himalayan and Sub-Himalayan Regions, whilst the south-east borders the Thar Desert.

The Punjab Plain is a broad alluvial plain without a hill at all. It slopes almost imperceptibly south-westwards. South of the Sutlej the land rises gradually and fades away into the Thar Desert. Five rivers thread their way across the plain—the Jhelum, Chenab, Ravi, Bias, and Sutlej. Eventually they all join to form the Panchnad, which in turn joins the Indus. In the dry season the rivers are shallow and slow, but in the rainy season, when the warm sun has melted the snows on the Himalayas and the monsoon

rains are pouring down on the Himalayan slopes, the rivers become rushing torrents often miles wide. The rush of water does not always follow the same channel. The river may leave its old bed and in a single night destroy miles of fertile fields. The whole region is very dry ; it is driest in the south-west, where the rainfall is less than 5 inches. The extremes of temperature between the hottest and coldest months should be noted.

The Punjab Plain can be divided into three parts :

(a) The North-Eastern Plain. This is the wettest part—near the foot of the Himalayas. There are numerous wells for irrigation in this region, but dry crops may also be grown without irrigation.

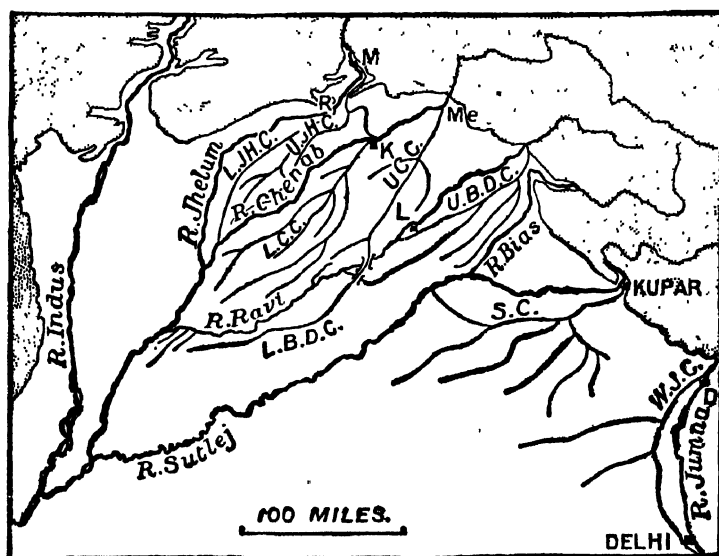


FIG. 450.—The Punjab canals.

(b) The South-Western Plain is so dry (5–10 inches) that it is practically impossible to grow anything without irrigation.

(c) The South-Eastern Plain, where the rainfall is usually from 20 to 30 inches but varies greatly from year to year. In good rainfall years many dry crops can be grown ; in bad years none.

More than half the crops depend upon irrigation. There are six important systems of Government Canals.

(1) The Western Jumna Canal takes its water from the River Jumna near where it leaves the mountains and waters the south-east of the plain.

(2) The Sirhind Canal is an old system taking its water from the Sutlej River and also watering the south-eastern plain.

(3) The Upper Bari Doab Canal takes its water from the Ravi River, where the Ravi leaves the mountains.

(4) The Lower Chenab Canal is one of the largest of the irrigation works in India. A great weir was built across the River Chenab at Khamki.

(5) The Lower Jhelum Canal takes its water from the Jhelum.

(6) The Triple Project or Upper Chenab-Lower Bari Doab Canal System is one of the cleverest examples of canal irrigation that exists. The Upper Chenab Canal takes its water from the Chenab at Merala, near the foot of the Himalayas. The main canal is carried across the Ravi River by an aqueduct or "water bridge" and then becomes the Lower Bari Doab Canal. But when this scheme was arranged it was found that so much water would be taken by the Upper Chenab Canal that none would be left for the Lower Chenab Canal. And so the Upper Jhelum Canal was built to bring water from the Jhelum to the Chenab at Khamki to help fill the Lower Chenab Canal.

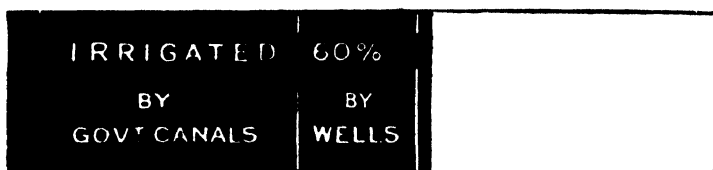


FIG. 451.—Proportion of crops irrigated in the Punjab.

As a result of irrigation many parts of the Punjab are "double cropped." Wheat, the most important crop, covers nearly a third of the area. It is reaped in spring; millet is often grown on the same ground and reaped in autumn. Wheat and millet, together with maize, form the staple food of the people. An excess of wheat is available for export and is sent to Europe through the port of Karachi. Another crop is barley. Oil-seeds are grown mainly for export. By far the most important crop not grown for food is cotton. On the irrigated land the long-stapled American cotton is grown and exported through Karachi. The Punjab being a dry region, much fodder is grown to feed the cattle used in ploughing.

The majority of the people are engaged in agriculture. In the old days the cultivators suffered severely from raids of war-like tribes of the hills, and so lived together in villages for protection. They still live together in small villages scattered over the plains. The huts are of mud or mud and wattle, and the roofs of the huts are flat, for there is little rain to run off. There are very few large towns.

Lahore is an old historic city and an old capital, and is now the centre of government of the Punjab. It forms one of the collecting centres for the rich northern parts of the plain. *Amritsar* is another centre near by. It is the holy city of the Sikhs and a busy trading town, and manufactures carpets. It suffers, however, very badly from fever. *Multan* is the natural centre of the dry south-western plain. Much of the trade to Karachi passes through Multan, which has long been a busy market town. Afghan traders visit the town and exchange their raw salt, spices, and fruits for piece goods.

Gujranwala and *Ludhiana* (with cotton-mills) are other centres in the northern part of the plain, whilst *Hissar* and *Jind*, and still more important *Patiala*, are in the south-east.

THE UNITED PROVINCES

The United Provinces of Agra and Oudh have a smaller area than the Punjab, but have nearly twice as many people. The population is denser than in any province of India except Bengal. Yet a large part of the United Provinces has a rainfall of less than 40 inches, and their prosperity is largely due to the great irrigation works. The north-western part of the United Provinces stretches into the Himalayan and Sub-Himalayan Regions (compare the Punjab), and a small strip along the south forms part of the Central Indian Plateau. But the largest part of the Provinces lies in the great Ganges Plain. The area west of Allahabad receives less than 40 inches of rain in a year, and so forms a natural region which we may call the Upper Ganges Valley or Dry Belt. The region east of Allahabad forms half of the Middle Ganges Valley, of which the other half lies in the Province of Bihar and Orissa.

It is in the United Provinces that great extensions of cultivation have been made in recent years into the Sub-Himalayan Region. Dehra Dun is one of the headquarters of the Forest Department in India. A famous and sacred place is Hardwar, where the Ganges leaves the mountains. A line of towns has sprung up on the borders of this region and the Ganges Plain—like frontier towns from which the cultivators have attacked the unhealthy foothills. Examples are Saharanpur, Pilibhit, Kheri, etc.

The Upper Ganges Valley, like the Punjab Plain, is a vast plain without a hill. Running roughly through the centre from north-west to south-east is the Ganges; marking roughly its south-western border is the Jumna. The region consists, therefore, of the Ganges-Jumna Doab and a large stretch of country north-east of the Ganges. The whole plain slopes very, very gently from Delhi (700 feet above the sea) to Allahabad (400 feet). The plains are cold in the cold season, but get very hot in the hot weather, though not quite so hot as the Punjab Plains. Since the rainfall is

nearly everywhere less than 40 inches, it is necessary to irrigate the land. The Ganges-Jumna Doab is especially well served by irrigation canals, and more than 50 per cent. of the crops are grown on irrigated land. In the Upper Ganges Valley there are four large canal systems :

(1) The Eastern Jumna Canal, which takes the water from the Jumna River near Faizabad, just where the river leaves the mountains.

(2) The Agra Canal, which takes the water from the Jumna River just below Delhi.

(3) The Upper Ganges Canal, which takes the water from the Ganges near Hardwar, where it comes down from the Himalaya Mountains.

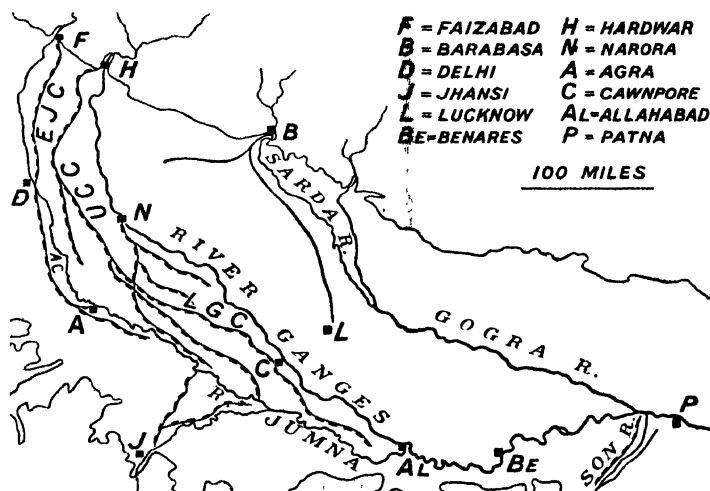


FIG. 452.—The irrigation canals of the United Provinces.

(4) The Lower Ganges Canal, which takes the water from the River Ganges at Narora.

(5) The Sarda Canal, which takes the water from the River Sarda at Barabasa and irrigates the Ganges-Gogra Doab as far as Lucknow, was opened in 1930.

(1), (3), and (4) water the Doab; (2) waters the land south of the Jumna. North of the Ganges, too, there is much irrigation from wells and tanks.

Of the whole Upper Ganges Plain more than two-thirds is cultivated, and only 15 per cent. is waste land. There are no forests at all. The most important crops are wheat, barley, and rice, all grown on irrigated land; whilst millet is the most important dry crop. Everywhere wheat is more important than rice, and in some of the western districts no rice is grown at all. Maize, gram, cotton,

fodder, and sugar occupy considerable areas. The cotton grown on the irrigated land is the valuable long-stapled American cotton. Nine out of every ten people in this region are engaged in cultivation, and live in small villages in huts of mud and wattle. Only one person in ten lives in a town. Although the Upper Ganges Valley is so densely populated, there are only fourteen cities with more than 50,000 people. Of the famous old towns Lucknow, Allahabad, and Muttra are now the most important.

Lucknow is an old capital and still the largest town in the province, though it is getting smaller. It is a railway centre. *Allahabad*, situated at the junction of the Jumna and Ganges, is an important place of pilgrimage. Now that railways have supplanted river routes, it has become a great railway junction and a collecting centre. *Muttra* is an old religious centre. *Farrukhabad*, on the Ganges, is an example of a place which used to be important owing to its situation on the great waterway, but the railways have left the town alone and it is rapidly declining.

Of the more modern or progressive cities there are :

Cawnpore, collecting centre and railway junction, with numerous manufactures of its own. *Meerut*, *Moradabad*, *Agra*, *Bareilly*, and *Aligarh*, all of which are growing centres of rich parts of the region. Notice the railways of the region.

The Middle Ganges Valley is a natural region lying partly in the United Provinces (east of Allahabad) and partly in Bihar. It is damper than the Upper Ganges Valley, and irrigation is less necessary. The wet-region crop, rice, gradually becomes more important than wheat. When compared with the Upper Ganges Valley there is more rain and a smaller annual range of temperature. We shall describe the region in greater detail under Bihar and Orissa. Taking the part which lies in the United Provinces, *Benares*, on the Ganges, is the largest town; an ancient centre of Hindu culture and a very sacred place of pilgrimage. *Faizabad* is a neglected river port, but *Gorakhpur* is now the great collecting centre and railway centre.

Along the north this part of the United Provinces borders Nepal, and a small strip of the United Provinces really lies in the Sub-Himalayan Region. There is a line of towns along the border, from which cultivation has been extended right to the Nepal frontier.

BIHAR AND ORISSA

The Provinces of Bihar and Orissa formed one province from 1912 to 1937. It was almost exactly the same size as the United Provinces, but includes a large area of forested plateau land and so has fewer inhabitants. Patna, on the Ganges, is the capital of Bihar, Cuttack of Orissa. The province falls very easily into three

natural regions which also correspond approximately with administrative divisions. These regions are (1) The Middle Ganges Valley, corresponding roughly with Bihar; (2) The Chota Nagpur Plateau, corresponding with Chota Nagpur; (3) The Orissa Coastal Strip, embracing the province of Orissa.

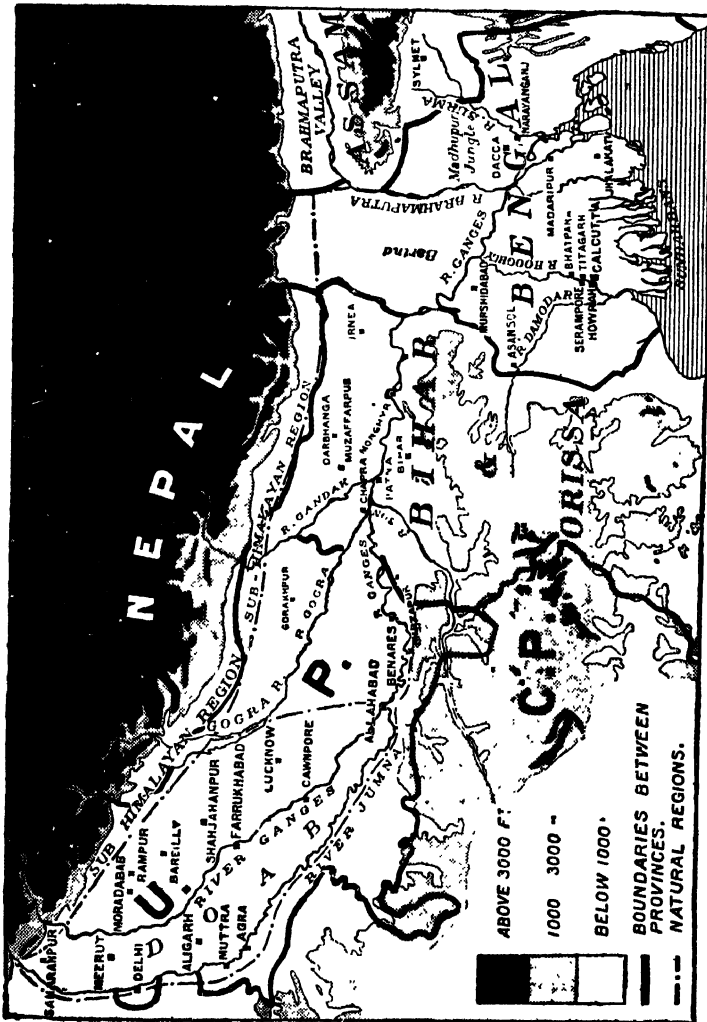


FIG. 453.—The Ganges Plain.

The Middle Ganges Valley.—This part of the Middle Ganges Valley is a little damper than the part lying in the United Provinces. Fig. 454 shows clearly the difference between the crops of this region and those of the Upper Ganges Valley. The inhabitants are the Biharis, who do not live in villages, but in small houses in the

midst of their fields. The pressure on the land is so great that every year large numbers of Biharis go to work in the tea plantations of Assam, or on the docks of Calcutta.

Patna is the seat of provincial government and a large collecting station. It has given its name to Patna rice, a very fine kind of rice. It is on the south of the Ganges, and so connected directly with Calcutta by railway. Patna lies also just below the junction

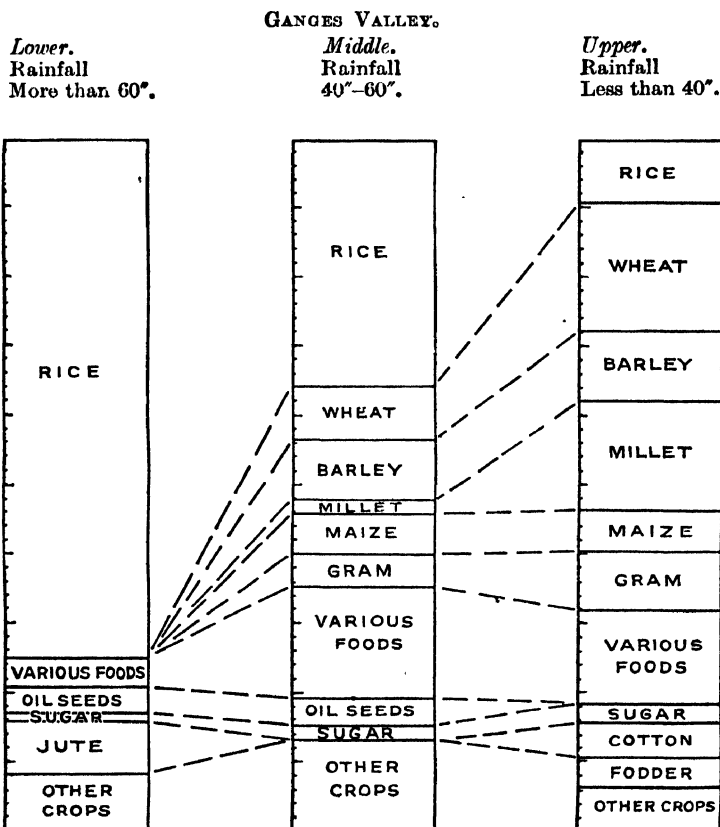


FIG. 454.—The crops of the Ganges Valley.

of three important tributaries of the Ganges—the Son, Gandak, and Gogra. *Monghyr* is a famous old town also on the southern bank of the Ganges; *Bhagalpur* is another town on the Ganges, farther east. Then there are several important towns which serve as collecting and distributing centres for the rich plains north of the Ganges. Examples are *Darbhanga*, *Muzuffarpur*, and *Purnea*. In the north the Province of Bihar borders Nepal and includes a small strip of the Terai country, described under Nepal.

The Chota Nagpur Plateau forms the north-eastern corner of the great plateau of Peninsular India. It is thinly populated and includes some of the wildest parts of India. In the depths of the forests are primitive tribes, such as the Santals, who still use bows and arrows and wear no clothes. An important industry is the collection of lac from the trees. The plateau consists mainly of old hard rocks; in the north there are mica mines, in Singhbhum iron and copper ores are obtained. On the borders of the plateau are tracts of coal-bearing sedimentary rocks, and it is on the borders of Bihar and Orissa and Bengal that the most important coal fields of India are found. The coal fields of Jharia, Raniganj, and Giridih produce about 19,000,000 tons a year, or nine-tenths of all the coal of India. There is a smaller field at Daltonganj in the north. The important towns are the coal-field towns, including the railway centre of Asansol. On the plateau is Ranchi, the hot-weather capital of the Province.

Orissa forms part of the coast region of the northern part of the east coast—the Northern Circars Region. Along the coast itself are useless sand-dunes or mangrove swamps, behind which are fertile paddy lands. Further inland are low tree-covered hills, and fertile valleys. Two-thirds of this fertile and thickly populated region are cultivated, and rice occupies more than four-fifths of the cultivated land. The chief towns are *Puri*, a famous place of pilgrimage, and a seaside resort; *Cuttack*, an old capital of the kings of Orissa; and *Balasore*, once an important port with English, French, and Dutch factories, but now little used.

BENGAL

Nearly the whole of Bengal belongs to one natural region—the Lower Ganges Valley or Deltas Region—consisting of the deltas of those mighty rivers, the Ganges and Brahmaputra. In the north a small strip of Terai country (known in Bengal as the Duars) belongs to the Sub-Himalayan Region, whilst the district of Darjeeling lies in the Himalayan Region. In the east the Lushai Hills and the small state of Hill Tippera belong to the Eastern Hills Region; in the west the region near the coal fields may be considered as belonging to the slopes of the Chota Nagpur Plateau. But by far the greater part of Bengal belongs to the Deltas Region.

Deltas Region.—For thousands of square miles there is not a hill or even a rock; the soil is everywhere a fine silt (alluvium) and not a stone is to be found. The region is practically flat; the rise from the sea towards the north is so gradual that it cannot be seen. Owing to the heavy rainfall—nearly everywhere over 60 inches—the country is always green and does not get dried up and brown like the Upper Ganges Valley.

The region may be divided into three parts :

(a) *The Ganges-Brahmaputra Doab, or North Bengal*, sloping gradually from the Sub-Himalayan Region in the north toward the Ganges. There are numerous silted-up river channels, and even now the rivers frequently change their courses. The usual flat surface is broken by a stretch of low hills called the Barind, covered by the remains of a former forest.

(b) *The Old Delta, or Central and Western Bengal*.—The great delta of the Ganges and Brahmaputra has moved gradually to the east, and Central Bengal is now a land of dead and dying rivers. The place of river channels which used to carry water from the Ganges to the sea is now often taken by large swamps or “bils.” Many of the bils have been drained and form valuable rice-land. Near the sea are the Sundarbans—great swamp forests. In Western Bengal west of the Hooghly River the level of the land gradually rises and the soil becomes poorer and harder, and the plain passes into undulating ground on the borders of the Chota Nagpur Plateau.

(c) *The New Delta, or Eastern Bengal*.—Here the great rivers are still actively building up their deltas, and every year huge quantities of silt are brought down by the Ganges and the Brahmaputra. In the high-water season a great part of the area is flooded, and a rich deposit of silt is spread over the country. In this region, the true delta, there are few or no roads; bullock-carts are useless, and nearly all travelling is done by boats. Closely connected with this region is the Surma Valley, which lies in the Province of Assam. The houses in the delta are built on mounds to prevent them from being flooded in the rains. Although so wet, this is a densely populated country and produces enormous quantities of rice and jute. In the north is a slight ridge, the Madhupur jungle. Although insignificant, this ridge has been sufficient to prevent the great rivers moving still further eastwards.

If we look at the uses to which the land is put we find 6 per cent. is covered with forests. These are the Sundarbans, and they furnish firewood for the numerous towns. Nearly a quarter of the region is covered by bils, swamps, rivers, etc., and cannot be used. There is about 11 per cent. of waste land, mainly in the Barind, Madhupur Jungle, and Western Bengal. That leaves nearly two-thirds of the land, which is cultivated. Look again at Fig. 454, and notice that by far the most important crop is rice, covering three-quarters of the cultivated land. Jute is another important crop. The dry-zone crops—wheat, barley, millet, maize, etc.—have all entirely disappeared.

Nearly all the people in this region speak Bengali. Three-

quarters of them are cultivators and live, not in villages, but in small houses or huts on mounds in the midst of their fields. They have not the same fear of fierce invaders as the people of the Punjab Plains, who in times past were forced to live together in villages for protection.

All the largest towns are industrial towns which have sprung up within recent years around rice or jute mills.

Calcutta is the largest city in India, and the second largest (after London) in the British Empire. *Dacca* is the second city of the region, and is the centre of the rich lands of the New Delta. Unlike Calcutta, it was an important city 300 years ago. Outside Calcutta and Dacca there are really no large cities or towns. The jute-mill and rice-mill towns, such as *Bhatpara*, *Titagarh*, and *Serampore*, are mainly on the River Hooghly. *Jhalakati* is a trade centre of Eastern Bengal, and the centre of the betel-nut trade. *Narayanganj* (a river port) and *Madaripur* are other collecting centres. *Goalundo* is another river port. *Sylhet* is the centre of the Surma Valley of Assam. Notice the succession of canals—the Calcutta and Eastern Canals—by which rice and jute can be sent by water direct from Eastern Bengal to the mills on the Hooghly.

SIND

Sind consists of a broad, dry alluvial plain stretching from the edge of the Baluchistan Plateau on the west to the Thar Desert on the east. Running from north to south through the centre is its life and soul—the Indus River. Just as Egypt is the gift of the Nile, so Sind is the gift of the Indus. In the past irrigation in Sind has been by “inundation canals,” which are only filled with water when the river is in flood, and which dry up in the hot weather. But now a great dam has been built at Sukkur, in the north of Sind, and the country was, in 1932, first irrigated by perennial canals. The Sukkur or Lloyd Barrage Scheme is one of the largest works for irrigation ever attempted. Away from the irrigated land Sind is a lonely barren desert. Sind became a separate province in 1937.

Practically no “dry” crops are grown in Sind. On the irrigated land wheat, millet, and cotton are the leading crops.

The largest town in Sind is *Karachi*, the third port of India. Another important town is *Hyderabad*, near the head of the delta.

BOMBAY

The Presidency of Bombay is among the largest Provinces of India. Many parts of it are, however, thinly peopled. The Peninsula of Kathiawar is made up of a large number of small native states whilst the important native state of Baroda is composed of several isolated tracts of country north of Bombay. The Presidency

runs a considerable distance down the west coast of India, and also includes a large section of the plateau of Peninsular India. It is thus obvious that the large and irregular-shaped Presidency of Bombay will fall into a number of natural regions. We can distinguish :

(a) Gujarat, including Kathiawar and Baroda, an irregular and variable natural region.

(b) The West Coast Region, a very wet region which lies between the Western Ghats and the sea.

(c) The Deccan Lavas or Black Cotton Soil Region, forming part of the plateau.

Gujarat on the whole is a lowland region, but it has numerous small hills. At the northern end it adjoins the Thar Desert and the very dry region of Sind ; at the southern end it adjoins the very wet region of the west coast. So we find the climate of Gujarat varies greatly from one part to another.

Most of the important towns of Gujarat lie on the railways. *Baroda*, the capital of the important state of Baroda, is a large railway junction, and has modern cotton-mills. *Surat*, near the mouth of the Tapti, was once the leading port of the west coast, but its place has been taken by Bombay. *Cambay* and other towns round the Gulf of Cambay are less important than formerly. Their local industries have largely been replaced by the great cotton-mills of Bombay. *Ahmadabad* is the great collecting centre of Northern Gujarat, and is also a mill town.

KATHIAWAR is a large peninsula suffering from a very variable rainfall. In the centre are forest-covered hills with valuable timber, but much of the country is a barren land of very little value. The people and their villages are concentrated in a few of the more fertile valleys. The towns of Kathiawar are mostly capitals of states, but also act as collecting centres for the more fertile portions of the peninsula.

CUTCH is a barren, rocky, treeless, and useless country, still drier than Kathiawar.

The West Coast Region runs right down the western coast of India. The northern part lies in the Bombay Presidency, the southern part in Madras. Halfway down the coast is the Portuguese territory of Goa. There are few bays which can be used as harbours, and only one important island, that on which Bombay stands. In the northern part of the region, it is only from Bombay that the mountain escarpment of the Western Ghats can be easily crossed. The West Coast Region really falls into three parallel strips. Near the sea are lines of sandbanks on which coconuts grow. At intervals are mangrove swamps. Behind the sandbanks are the flat alluvial lands. Everywhere the rainfall is more than

80 inches, and rice occupies half the cultivated land. Further inland are the hill slopes covered with dense evergreen forests. Forests cover a quarter of the whole region. The many short rivers are of little use for boats, but many of them can be used for floating logs of timber from the forests. In years to come they may be used for generating electricity. *Bombay* is the only really large town.

The Deccan Lavas Region.—The north-western part of the great plateau of Peninsular India has been covered by great sheets of lava which weathers into a dark soil, particularly suited to cotton. The great sheets of lava have only been cut through by some of the deeper river valleys, such as that of the River Tapti. Except the Dharwar district in the south, the whole of Bombay east of the Ghats lies in this natural region. The region also includes Berar and the western half of Hyderabad. The region lies in the rain-shadow of the Ghats, and except along a narrow strip near the Ghats the rainfall is less than 40 inches. Forests cover a considerable area, and are found especially on the slopes of the Western Ghats. There grow

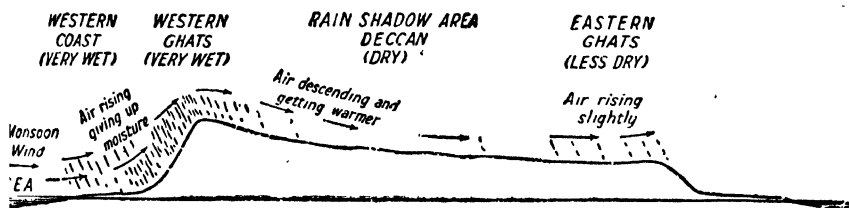


FIG. 455.—Section across the Plateau of Peninsular India.

teak and other valuable trees. Two-thirds of the area is cultivated, but the crops are nearly all dry crops since there is little flat land available for irrigation, nor are there any large permanent streams whose water could be used. The use of wheat is spreading, but the staple food grain is still millet, and millet covers nearly half the cultivated land. This is the greatest cotton-growing region of India, and nearly a quarter of the cultivated land is devoted to cotton. The short-stapled Indian cotton is grown principally. The raw cotton is sent to Bombay, either to be exported raw or used in the mills there. This drier region does not support so many people as the wetter rice-growing lands, and there are only about 150 people to the square mile.

Poona lies near the crest of the Western Ghats, and commands one of the gaps or gateways leading to Bombay. It is the hot-weather capital of the Bombay Presidency. *Sholapur* is a big centre farther south.

MADRAS

Among the Provinces of India, the Presidency of Madras is now the largest as well as one of the most populous.

The Presidency lies in the following natural regions :

- (a) West Coast Region, very wet.
- (b) Carnatic Region, or Tamil Plains, forming the southern part of the east coast.



FIG. 456.—Map of Southern India (Bombay, Madras, Hyderabad, and Mysore).

- (c) The Northern Circars Region, or northern part of the east coast.
- (d) The Deccan Plateau.

The West Coast Region in Madras is similar to the part in Bombay, but the alluvial plains between the hills and the sea are

broader. The whole region is very wet, and can be divided, still more distinctly, into three strips :

(a) The sand dunes along the coast, largely covered by coconuts.

(b) The flat alluvial land behind the sand dunes. The water of small streams from the hills is prevented from reaching the sea by the line of sand dunes, and so spreads out to form shallow lagoons. The lagoons have been connected by canals, and it is possible to travel for hundreds of miles along the west coast through these canals. Many of the lagoons are open to the sea, and some are deep enough to form harbours for native craft. One, the harbour of Cochin, is being dredged near its mouth, and may soon form a very important harbour on the west coast. The banks of the lagoons are often lined with coconut plantations, whilst every suitable piece of land is planted with paddy. Here and there are groves of the areca or betel-nut palm, and the pepper plant, for which this coast has so long been famous, is still grown.

(c) The slopes of the Western Ghats are covered with dense evergreen forests, and forests cover nearly a quarter of the whole region.

This region is densely populated. The staple food is, of course, rice, but many of the rice cultivators are backward, jungle tribes. The coconut palm is of great importance to the inhabitants. Their huts are thatched with its leaves ; the wood is used for building and for firewood. The preparation of the fibre of the husks, or "coir-picking," is an important industry and the dried kernel (copra) is exported. Coconut oil is also obtained, and the juice of the coconut is made into a strong drink. Rubber planting is becoming a noteworthy industry in Travancore. Fishing is a common occupation along the coast.

Mangalore is a small town connected by rail with Madras. *Calicut* is the fourth largest town in the Madras Presidency, and has a small timber trade. Like Cochin, it was once a famous spice port. *Cochin* is likely to increase greatly in size and importance when its harbour is deepened. *Alleppey* and *Quilon* in Travancore are growing industrial centres where coir rope and mats are made. *Trivandrum* is the chief town of Travancore, and can now be reached by railway from Madras.

The Carnatic Region stretches from the coast of the Bay of Bengal to the crest of the Cardamom Hills, which separate it from the West Coast Region, and, further north, to the edge of the Deccan Plateau. The Carnatic Region falls into two parts ; the lowlands near the coast or Coastal Plain, and the hilly western part. The Coastal Plain consists mainly of alluvium, but the hills are of

old hard rocks. The climate of this region is different from that of all other parts of India, the rainiest months being October, November, and December.

Nearly two-thirds of the coastal plain is cultivated, but rather less than a half of the hilly parts, of which a quarter is covered by forests. This part of India used to suffer greatly from famine, for the rainfall is only about 40 inches—much less in the western parts—and varies greatly from year to year. There are many “tanks,” but in bad rainfall years the tanks may never be filled. Government has now completed a number of large irrigation works in this region, but the irrigated land is not nearly so extensive as in the dry parts of the Hindustan Plain. The Periyar River flows down the very wet western side of the Cardamom Hills. The water has now been brought through a tunnel to the dry eastern side of the hills, and used to water the flat land round Madura. West of Madras a large tract of country is watered from the Poini, Palar, and Cheyyar rivers. A great system of canals covers the Cauvery Delta. This is one of the oldest of the large irrigation works in India.

In the coast lands rice is more important than millet, in the hills millet is more important than rice. Both are used by the people as staple foods. Everywhere a considerable area is devoted to ground-nuts and cotton. Down the sandy dunes of the coast many coconuts are grown. On the slopes of the Nilgiri Hills there are tea gardens. The most important trees of the forests are teak and sandalwood. Mica is mined in Nellore. Along the coast salt is obtained from the sea, and there are many fishermen; but there are no inlets to serve as harbours. At the small ports steamers have to anchor a mile or more from the shore, and land their goods and passengers by small boats. Madras has the only good harbour along the coast—it is entirely artificial. Madras is the third largest city and the fifth most important port in India. As a port its trade is a long way behind Karachi and Rangoon. There are cotton-mills in Madras, and both cotton goods and raw cotton are exported. The tanning of hides and export of leather also belong to Madras. Pondicherry is the capital of the French possessions in India, which comprise a few isolated towns.

Cuddalore and *Tuticorin* (famous for pearl fisheries) are two ports. *Madura*, *Trichinopoly*, and *Tanjore* are inland centres.

Dhanushkodi is only 22 miles from the nearest point of Ceylon. It is not really a town, but merely the terminus of the South Indian Railway; the mails to Ceylon go by this route.

Notice the railways from Madras, and the way in which they make use of natural gaps to reach the west coast. Near the coast, running north and south from Madras, is the Buckingham Canal.

The Northern Circars Region.—This region lies between the crest of the Eastern Ghats and the Bay of Bengal. The central

part is made up of the big irrigated deltas of the Godavari and Kistna rivers. Elsewhere the region is hilly and many of the hills reach right to the coast. The flat areas are of alluvium, but the hills are of crystalline rocks. Manganese ore is obtained near Vizagapatam. More than half the land is cultivated; on the damper hills there are forests. Taking the region as a whole, rice is the chief crop, followed by millet. It is interesting to notice the effect of rainfall on crops. The dry district of Guntur, with 31 inches of rain, has only 3 per cent. of rice. Northwards there is a gradual increase in rainfall and rice; wet Ganjam, with 45 inches of rain, has 54 per cent. of rice.

There are no good harbours down the coast except the fine one, completed in 1933, of *Vizagapatam*. This town is partly sheltered behind a headland called the Dolphin's Nose. A railway has been built from *Vizagapatam* inland to the heart of Central India.

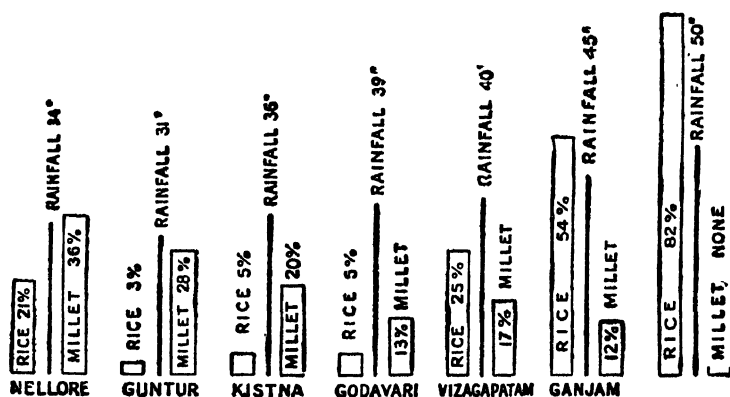


FIG. 457.—Crops and rainfall on the East Coast.

Cocanada was previously the largest port, and has a small but rich hinterland. *Masulipatam*, *Calingapatam*, and *Gopalpur* are other small ports. *Vizianagram* is the largest inland town.

The Deccan Plateau.—The "Deccan districts" of Madras lie on the Deccan Plateau, but we will describe the main plateau under Mysore before dealing with this area.

The Eastern Ghats are partly occupied by the Agency Division of Madras—to be described later.

MYSORE

This important native state is ruled by a Maharaja who has direct relations with the Government of India. Mysore lies entirely on the high southern part of the Deccan Plateau. Besides embracing Mysore, the Deccan Plateau stretches away northwards to embrace

the Deccan districts of Madras, the eastern half of Hyderabad, and the Dharwar District of Bombay.

The Deccan Plateau.—In some books the whole of the plateau of Peninsular India is called the Deccan; but, strictly speaking, only the southern part should receive that appellation. In the south the plateau is higher, and has not been so cut into by river valleys as it has been farther north. The crests of the Western Ghats usually exceed 3,000 feet, and the whole of Mysore is over 2,000 feet. But farther north the Kistna and its tributaries have cut deeply into the plateau, and the portions of the plateau lying in Madras and Hyderabad are between 1,000 and 2,000 feet high. The Deccan Plateau lies in the rain-shadow of the Western Ghats, and is dry. A strip along the western side, which is really the slopes of the Ghats, is damper, but some of the plateau receives less than 20 inches a year. Unfortunately, too, the rainfall is irregular, and in some years the numerous tanks are not even filled with water.

The plateau consists entirely of old crystalline rocks. Gold is mined in the Kolar Goldfield of Mysore. Manganese ore is also obtained in Mysore. Although the old rocks yield a poor soil, more than half the plateau is cultivated, and some of the flatter parts are irrigated. Forests cover a considerable area on the damper western parts and on the wetter slopes of other hills. Millet is the leading grain, but rice can be grown on the flat surface of the plateau in Mysore, or on the irrigated valley land in Madras. Cotton occupies one-tenth of the cultivated area. Coffee-planting used to be an important industry in Mysore, but a disease destroyed many of the bushes, and recovery was prevented by foreign competition, especially of Brazilian coffee. Sheep flourish on the dry grass on the hillsides, and the Deccan Plateau has a quarter of all the sheep of India.

Mysore is the capital of the state, but *Bangalore* is the largest town and seat of government. There are silk factories at Mysore and Bangalore. *Kolar* is the centre of the gold fields. Outside the borders of Mysore is *Ootacamund*, the hill station of Madras Presidency. In the Deccan districts of Madras is *Bellary*, the largest town, and *Kurnool*, which lies at the head of the Kurnool-Cuddapah Canal. This canal formed a small part of an enormous scheme to irrigate most of the drier part of Madras, but it was a failure.

The tiny British Province of Coorg, with its principal town, Mercara, lies to the south-west of Mysore, on the slopes of the Western Ghats. Much of it is forested.

HYDERABAD

Hyderabad is the largest native state in India, and is ruled by the Nizam. The capital of the state, Hyderabad, is the fourth largest city in India. The state lies entirely on the plateau of

Peninsular India, and falls into two halves. The western half, or **Marathwara**, where **Marathi** is spoken, is covered by the **Deccan Lavas**, and forms part of the **Deccan Lavas Region**, already described under **Bombay**. It is not so highly developed as the neighbouring parts of **Bombay** and **Berar**, but grows very large quantities of cotton, and, as in **Berar**, the staple food of the people is millet. **Gulbarga** and **Aurangabad** are two of the most important towns.

The eastern half, or **Telingana**, where **Telugu** is spoken, is part of the **Deccan Plateau**, described under **Mysore**. The old crystalline rocks yield a less fertile soil, and very much less cotton is grown than in the western half. There are about 150 people to the square mile. **Hyderabad** is the natural centre of the state, and is now well served by railways.

The north-eastern part of **Hyderabad** slopes down towards the **Godavari River**, and cannot really be considered as part of the **Deccan Plateau**. The **Godavari Valley** almost forms a natural region of its own, which lies mainly in the **Central Provinces**.

THE CENTRAL PROVINCES—including **BERAR**

The **Central Provinces** and **Berar** occupy a large area in the heart of India. The **Central Provinces** are larger than the **United Provinces**, but have only one-third as many people. On the whole, the **Central Provinces** are not so well developed as most of the **British Provinces** in India, largely because the country is not so suited for development.

The country is very varied. Running through the north of the **Central Provinces** is the great line of highlands which divides **Peninsular India** from **Northern India** - the **Satpura Line**. In the **Central Provinces** the highlands are known as the **Mahadeo Hills** and the **Maikal Range**, and pass eastwards into the **Chota Nagpur Plateau**. North of this line the country belongs to the **Central Indian Foreland**. South of this line is **Berar**, forming part of the great cotton-growing region of the **Deccan Lavas**, described under **Bombay**. The flat land round **Nagpur** forms part of the **Godavari Valley**. Around **Raipur** is another plain, the **Chhattisgarh Plain**, or **Valley of the Mahanadi**, whilst in the south are the wild hill regions of the **Eastern Ghats**.

Berar is the most developed region, on account of its rich cotton soil. **Akola** and **Amraoti** are the collecting centres from which the cotton is sent by rail to **Bombay**.

The Chhattisgarh Plain, or **Valley of the Mahanadi**, is a rice-growing region centring round the town of **Raipur**. The rainfall is only a little over 40 inches, so a good proportion of the land has been irrigated.

The Eastern Ghats form a wild hilly region, like the **Chota Nagpur Plateau**, inhabited largely by primitive forest tribes.

Jubbulpore is a large and important town, occupying a key position at the head of the *Narbada Valley*, just where the Central Highlands can be easily crossed.

RAJPUTANA AND AJMER-MERWARA

Rajputana is a large federation of native states in the north-west of India, south of the *Hindustan Plains*. In the centre lies the small British Province of *Ajmer-Merwara*. Running through the centre of Rajputana from south-west to north-east is the *Aravalli Range*. North-west of this range the country is very dry, and slopes down gradually towards the *Indus Valley* and the *Punjab Plain*. This sloping area forms the *Thar* or *Great Indian Desert*. South-east of the *Aravalli Range* there is an upland country which may be called the *Rajput Upland*.

The Thar Desert is a vast area lying between the *Aravalli Hills* and the plain. It is a sandy waste, interrupted by bare rocky hills and waterless valleys. The ground is often entirely bare, but in some places there may be a few shrubs or fleshy plants. The rainfall is generally less than 10 inches, and is very irregular, falling mainly during storms. Although the rainfall is greater than in the rich *Indus Valley*, the land remains a desert because there are no large rivers which can be used for irrigation. The desert is almost uninhabited. Villages may spring up where there is a little water, and some millet can be grown; but when the water supply fails, the village has to be abandoned. Many people own camels, and trade across the desert. *Jaisalmer* is a centre of the camel caravan routes. *Bikanir* is noted for its manufactures of camel-hair goods and cotton goods. Throughout history the desert has formed a great barrier to the movement of man.

The Rajput Upland Region, as a whole, is a dry region, receiving less than 40 inches of rain, but in the damper and more sheltered parts forests can grow. Most of the area consists of old crystalline rocks, but in the south there are great sheets of *Deccan Lava*. Owing to the irregular rainfall, the region is thinly populated. The staple food is millet, and much gram is grown for fodder. Agriculture is bad, and so more people earn their living by industry than in other parts of India. Woollen goods, especially blankets, are made from the wool of sheep and goats in many places. In the drier parts, bordering the *Thar Desert*, camel hair is used for carpets, etc.

Ajmer is a large town with railway workshops, food and textile industries. It is also situated on an important railway. *Jaipur* is larger than *Ajmer*, but is getting smaller. *Jodhpur* is another large town.

The other towns in Rajputana, such as *Udaipur*, owe their importance usually to their being capitals of states.

THE CENTRAL INDIA AGENCY

The Central India Agency is a federation of native states lying in Central India. The most important is Gwalior. The states form two blocks of country, separated by a portion of the United Provinces. The western half lies in the Rajput Upland Region; the eastern half lies in the Central Indian Foreland.

In the western half *Indore* is the largest town and is an industrial centre. *Bhopal* has few industries, and is getting smaller. *Lashkar* and *Ujjain* have cotton factories. The town of Gwalior is on the borders of the Ganges Valley.

The Central Indian Foreland, including the regions known as Bundelkhand and Baghelkhand, lies between the Central Indian Highlands and the Ganges Plain. The rainfall is about 40 inches; millet and cotton are the most important crops. The eastern part is damper and is watered by the Son River.

BURMA

Burma until separation in 1937 was the largest of the Provinces of India, but in most respects it is quite different from India proper. It is shut off from India by a wall of mountains over which there is no railway nor proper road, so that Burma can only be reached from India by sea. The people who inhabit Burma are Mongolians, more closely allied to the Chinese than to the Indians. In the province are the numerous native states collected together as the Federated Shan States, as well as certain hilly tracts which are not administered at all.

Physical Features.—The important feature of the mountain ranges and the rivers is that they both run from north to south. The River Irrawaddy is navigable by river steamers as far north as Bhamo, nearly 1,000 miles from its mouth. Its big tributary, the Chindwin, is also navigable for several hundred miles. Some of the smaller tributaries can be used by small boats, but they are more important for floating logs of timber from the forests to the main river. The Salween is only navigable by steamers for about 80 miles, when it passes through a gorge with rapids. The coasts of Burma are quite different from those of India. Both the Arakan and Tenasserim coasts are rocky and fringed with numerous islands.

Geology.—The Arakan Yomas and the Pegu Yomas are two fold ranges of young rocks. Between the two lies an area of young soft rocks, little folded, forming the valley of the Chindwin and the Lower Irrawaddy. It is here that the great oil fields of Burma are found, and Burma produces about 270,000,000 gallons of oil every year. The wild mountainous eastern half of the province—that is, the Shan Plateau and its southward continuation into Tenasserim—consists of old hard rocks. In the north rubies and other precious

stones are found at Mogok, but the mines are not so important as they used to be. At Bawdwin is one of the largest deposits of silver and lead ore in the world. The ore is smelted near by at Namtu.

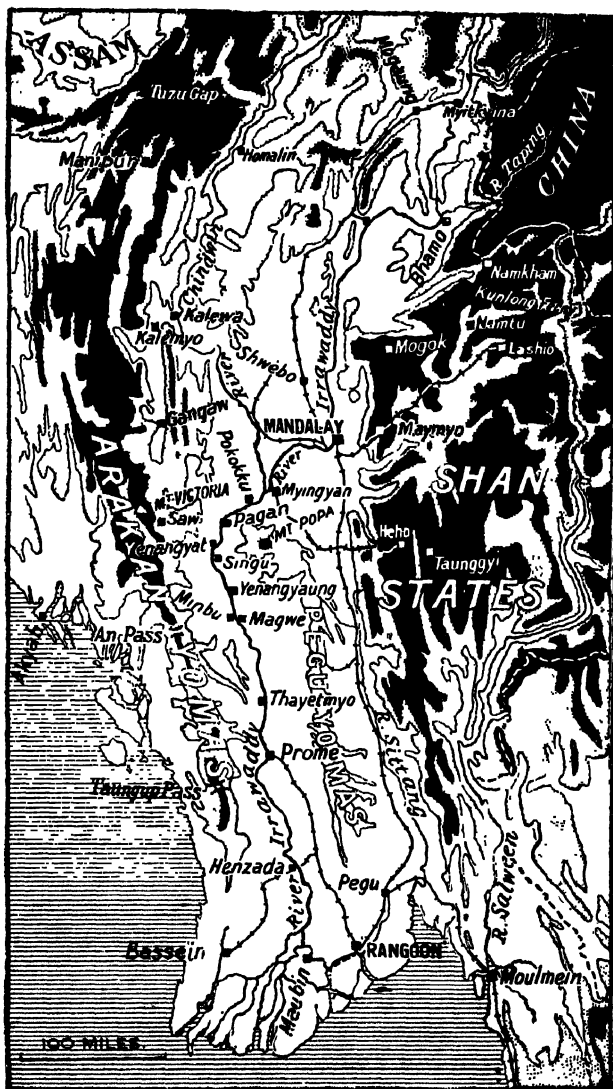


FIG. 458.—General map of Burma.

There are big deposits of silver and lead ore near Heho, farther south. Tenasserim has rich deposits of tin, especially around Tavoy, and with the tin is found wolfram. There are numerous deposits of poor quality coal in Burma, but they are not yet mined.

Climate.—The important feature about the climate is the 'Dry Belt' of Central Burma, which lies in the rain-shadow of the Arakan Yomas and receives less than 40 inches of rain a year. All the coastal region receives a very heavy rainfall. Central Burma is very hot in the hot weather owing to the absence of clouds and the cooling influence of rain, as well as distance from the sea.

Vegetation.—Burma is less thickly populated than most parts of India, and so natural vegetation still covers a very large part of the country. Where the rainfall is more than 80 inches, evergreen forests are found, but the valuable forests of Burma occur where the rainfall is between 40 and 80 inches. It is here that the monsoon forests with teak, pyinkado, in, ingyin, and other valuable timber trees are found. Teak is very rarely found by itself. It is nearly always mixed with many other trees. The teak forests are found on the Pegu Yomas, the eastern slopes of the Arakan Yomas, and the hill ranges north of the Dry Belt. Some teak is also found on the Siamese border, and is floated down the River Salween to Moulmein. The drier parts of Burma are covered with scrub land, whilst the hills and plateaus above 3,000 feet are clothed with evergreen oak forests together with some grass land.

The cultivated land is found mainly on the broad stretches of alluvium which border the rivers and build up their deltas. People of the hills merely grow enough for their own needs on small clearings in the jungle near their villages. The great food grain of Burma is rice, which occupies two-thirds of all the cultivated land in the province. In the Dry Belt sesamum, millet, beans, ground-nuts, and cotton are grown.

Population.—Although Burma is over 250,000 square miles, it has only 14,667,000 people. Over 84 per cent. of these are Burmans, and they live mainly on the fertile alluvial lands by the rivers. They are all Buddhists by religion, and have no caste system; in most respects men and women have equal rights.. The hilly

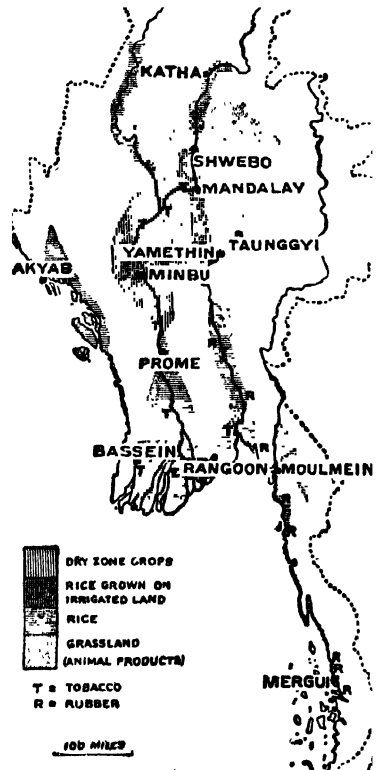


FIG. 459.—The crops of Burma.

regions and the plateaus are inhabited by more backward people, such as the Chins of the Arakan Yomas, the Karens of the Pegu Yomas, the Shans, Palaungs, and the Was of the Shan Plateau, and the Kachins of the north. They number about a million. Then there are nearly a million Indians of all sorts who have settled in Burma.

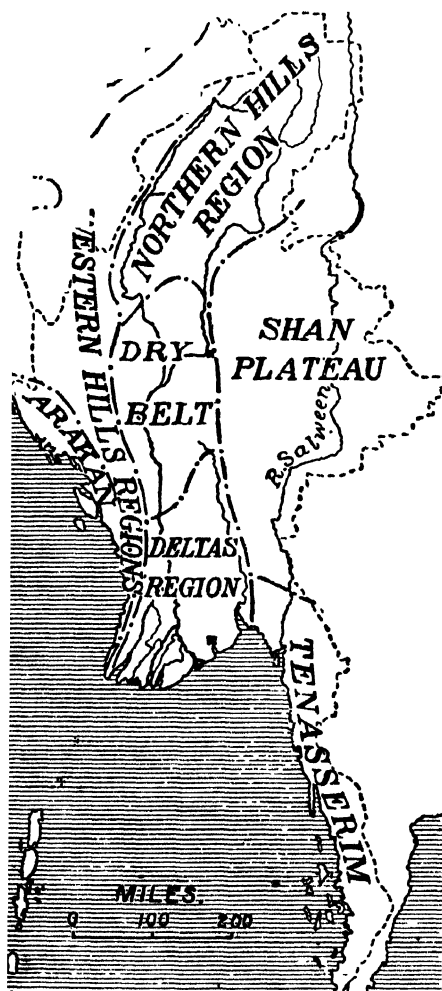


FIG. 460.—The natural regions of Burma.

Natural Regions.—

Burma falls very simply and naturally into seven natural regions.

The Arakan Coastal

Strip forms a narrow tract of land between the mountain wall and the Bay of Bengal. It is broadest in the north and gets narrower towards the south. It is almost everywhere hilly: only in one place is there a stretch of flat land. The coast is rocky, and there are numerous inlets and islands. The rivers are for the most part short rushing torrents from the mountains. Only one-tenth of the land is cultivated, one-half is waste land, and the remainder is covered by evergreen forest or bamboo jungle. Some, but not all, of the waste land might with difficulty be cultivated. The region catches the full force of the south-west monsoon, and all parts get a heavy rainfall—not less than 100 inches. By far the most important crop is rice. Most of the people live on the flat land which lies near the town of Akyab.

Akyab has a good harbour, but is only a small port because it has a small hinterland backed by high mountains. Some fishing is carried out along the coast. The only easy way between Arakan and the remainder of Burma is by sea.

The Tenasserim Coastal Strip also forms a narrow tract of

land, between the Siamese border and the Gulf of Martaban. In many respects it is like the Arakan coast. It is nearly everywhere hilly or mountainous: only in the north, around Moulmein, is there a stretch of flat land. The country is formed largely of ranges of hills running north to south and consisting of granite. Where the granite masses reach the sea they form rocky islands. Between the granite ranges is lower land consisting of old but softer rocks which have been worn away near the coast to form low islands or mangrove swamps. A large part of the region is covered with dense evergreen forests of equatorial type. Everywhere the rainfall is more than 100 inches, and often more than 200. Rice is again by far the most important crop. Rubber plantations cover a considerable area. Less than one-tenth of the area is cultivated. The majority of the people live around the old port of *Moulmein*, but the harbour is becoming choked by mud brought down by the Salween and is not suitable for large ships. *Tavoy* exports the tin which is mined in the district. Farther south is *Mergui*, which may become an important port, because it is proposed to construct a railway from Mergui across to Siam. From the west bank of the Salween, opposite to Moulmein, there is a railway to Rangoon.

The Western Hills Region consists of a series of parallel ranges, sometimes rising, as in Mount Victoria, to 10,000 feet. The hills are difficult to cross, and there are only a few difficult mountain paths from one side to the other. The region is clothed mainly with a poor evergreen oak forest, of very little value. In places there are pine forests, but the forests are economically inaccessible. Large parts of the region are practically uninhabited. The few Chin inhabitants lead a miserable existence by growing a few crops on hillside clearings.

The Shan Plateau is a broad area of old hard rocks, mostly 3,000 feet above sea-level, but deeply entrenched by the deep, narrow Salween Valley, and by other river valleys. The western border is well marked, and the land drops rapidly to the level of the Irrawaddy and Sittang Valleys. The plateau receives a moderate rainfall and a large area of the waste land might be cultivated, but the land is very sparsely populated, and the various hill tribes are not very progressive. There are also considerable areas of grass land suitable for sheep, goats, and cattle. Two railways penetrate into the plateau; one from Mandalay to Lashio. Near this railway, and connected with it by a narrow-gauge line, are the Bawdwin Mines and Namtu Smelting Works. To the north of the Shan Plateau lies the most important of the routes from Burma to China — along the Taping Valley through the town of Bhamo.

The Northern Hills Region.—This region stretches from the mountain wall which separates Burma from Assam and Tibet, as far southwards as the borders of the Dry Belt. To the west of the

region lies the valley of the Chindwin ; in the east the valley of the Irrawaddy. In the north the country is wild, inhabited by a few Shans and Kachins. The famous jade mines of Burma are in this region, and the jade is sent to China through Bhamo.

The Dry Zone is, next to the Deltas Region, the most important region of Burma. It is, generally speaking, a plain, and in the centre lies the isolated peak of Mount Popa, nearly 5,000 feet high. Mt. Popa is an old volcano, and lies at the northern end of the Pegu Yomas. The Dry Zone may be defined as the region of Burma which receives less than 40 inches of rainfall. In the centre the rainfall is as low as 20 inches. It is too dry for the proper growth of forests, and the natural vegetation is a poor scrub. One of the small trees is cutch, from which a yellow dye is made. Although it is so dry, there is a good population in the Dry Belt. Some parts, especially south of Mandalay, are irrigated and rice is grown : in other parts the typical Dry Zone crops—sesamum, millet, beans, ground-nuts, and cotton. The great oil fields of Burma are situated in the Dry Belt. The most important is Yenangyaung and Singu. Most of the oil is sent by pipe line direct to the refineries at Rangoon. The Dry Belt is the natural centre of Burma, and from it all parts of the country are easily reached, especially by the Irrawaddy, which forms the great highway. So we find the old capitals, such as Mandalay and Pagan, are in the Dry Belt.

The Deltas Region comprises the most important part of Burma. It consists of the broad valley of the lower course of the Irrawaddy and its large delta, and the narrower valley of the Sittang and the much smaller Sittang delta. Separating these two alluvial plains is the low range of the Pegu Yomas, covered with valuable forests. Rangoon is situated at the southern end of the Pegu Yomas, and so commands both valleys. The rainfall is good, over most of the true delta it is more than 80 inches, but decreases northwards. At the southern end of the Pegu Yomas evergreen forest is found, but farther north is monsoon forest of teak, pyinkado, and other valuable trees. It is the nearness of these forests to Rangoon and the sea which has made them specially important. The lower, alluvial lands are almost entirely cultivated, and by far the most important crop is rice. This part of Burma is thickly populated, except in the forests. The cultivators are mostly Burmans. The towns of the region are mostly collecting centres for rice—examples are Henzada, Bassein, Maubin, Pegu. Notice how well Rangoon is situated, so that it can collect and export the produce of nearly all parts of Burma.

Communications of Burma.—The River Irrawaddy and its tributary the Chindwin are still the most important highways of Burma. Small boats can use many of the smaller streams, and where the small streams join the main river, ports often spring up.

Many of the creeks of the Irrawaddy Delta can be used by quite large steamers, and two canals have been cut to make the journey across the delta from Bassein to Rangoon shorter. The rice grown in the delta is brought to Rangoon by "paddy boats" through the delta creeks. Many of the small streams of Burma are used for floating logs of timber from the forests to the saw-mills. The railways of Burma are all metre gauge. The main line does not run up the Irrawaddy Valley, but up the Sittang Valley to Mandalay. A ferry there connects it with the continuation which runs to Myitkyina. Another line from Rangoon runs to Prome on the Irrawaddy, but the big oil fields and many towns of the Dry Belt can only be reached by river. Burma has very few roads. The roads which exist are small local roads, and there is not even a main road between Rangoon and Mandalay. Three important roads penetrate the Shan Plateau—one to Mogok, one to Maymyo, and one to Taunggyi.

The Trade of Burma.—Burma has three main exports—rice, petroleum and its products, and teak. Much less important are cotton, lead, silver, etc. More than one-third of the exports of Burma go to India. Much of the rice is used to feed India and Ceylon. As with the other parts of India, the imports of Burma are cotton goods (from India, Great Britain, and Japan), machinery (from Great Britain and United States), and coal. Most of the trade of Burma passes through Rangoon (86 per cent.). The minor ports are Akyab, Moulmein, and Bassein. There is a small overland trade between Burma and China (through Bhamo) and between Burma and Siam.

CEYLON

Position.—Ceylon is a pear-shaped island about 25,000 square miles in area, situated to the south of Peninsular India, with which it is structurally comparable, and must once have formed part of the same massif. It is farther south than any part of India or Burma, and Colombo is only 7° N.

Physical Features.—Ceylon consists of a central mass of mountains, surrounded by broad coastal plains. Many of the central mountains are high, the highest being more than 8,000 feet. In the north the coastal plain is flat and there are several sandy peninsulas. The end of the Mannar peninsula is only 22 miles from the nearest point of India (Dhanushkodi). Ceylon is very nearly joined to India between these two points by a line of sandbanks and rocks called Adam's Bridge.

Geology.—The mountains of Ceylon consist of the same old, hard, crystalline rocks as the Deccan. These rocks also underlie the coastal plain, but there they have been covered by a thick coat

of *laterite*, a rock formed in hot, wet countries with alternating dry and wet seasons. Laterite is a soft red or brown rock which hardens

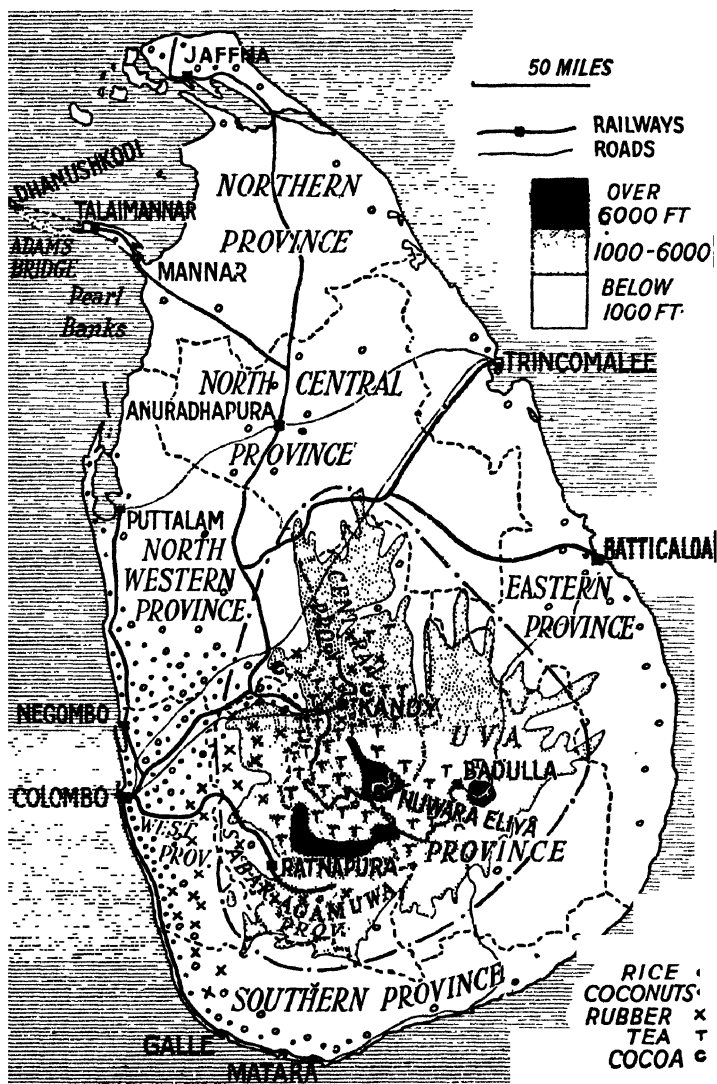


FIG. 461.—General map of Ceylon.

Each dot or symbol for rice, coconuts, rubber, etc., represents 10,000 acres.

on exposure, and has a cellular texture like a coarse brick. In the north of the island the old rocks have been covered by soft limestone. Round the island there are many sand dunes. The old, crystalline

rocks of Ceylon are noted for their beautiful gemstones and for their mineral graphite.

Climate.—Ceylon is nearer the equator than any part of India, and has almost an equatorial climate. The daily range of temperature is very small; at Colombo it is only 12 degrees. The annual range is also very small. January is the coolest month (80 degrees), and May the hottest, but at Colombo there is only a difference of 5 degrees between the two. Ceylon gets its rain from both the north-east and south-west monsoon. There is a heavy rainfall on the west and south-west coasts and the mountains from the south-west monsoon, and also a heavy rainfall on the north-east coast and eastern slopes of the mountains later in the year from the north-east monsoon. The northern part of the island has no hills to intercept the winds, and is a dry region. So also is the south-eastern part of the island. Thus, despite the small size of Ceylon, it has a varied climate.

Vegetation.—Just as the climate of Ceylon varies a great deal, so does the natural vegetation. The lower slopes of the mountains used to be covered with thick evergreen forest, but are now largely cleared for rubber plantations and tea gardens, and there is little timber of value left. The wetter parts of the lowlands were also covered with wet evergreen forests, and the drier parts with scrub forests. A great part of the wetter land is now used for rice and coconuts, but the drier parts are still untouched.

Taking the whole of Ceylon, about one-fifth is cultivated. Thick forests cover about one-fifth of the area, and there is a large amount still covered by waste land which might be used.

Population.—There are rather over 5½ million people in Ceylon. The principal race is the Sinhalese or Cingalese, who, between 2,000 and 3,000 years ago, came from the north of India and conquered Ceylon. The Sinhalese are Buddhists by religion. At Kandy is the Temple of the Tooth, where a tooth of Buddha is preserved, and which is one of the most sacred places in the world to Buddhists. The north of Ceylon is inhabited mainly by Tamils, who are Hindus by religion, and who came over from India either as conquerors in past ages, or more recently as labourers in the tea gardens, coffee and rubber estates. The Moors are Mahomedan traders, boatmen or fishermen who came originally from North Africa. The descendants of the old Portuguese and Dutch settlers are called Burghers. In the wilder parts of the mountains there are still a few Veddas, a very primitive hill tribe. The people live mainly on the wetter parts of the plains and on the hills. On the dry, infertile soils of the northern regions and the east there are very few people.

Government.—Ceylon is entirely separated from India in matters of government. The first Europeans to settle in the island

were the Portuguese in 1505, followed by the Dutch, and later by the English. The old Dutch ports are still to be seen at Galle and other places. Ceylon was separated from the Presidency of Madras in 1802 and made a Crown Colony, and so became a separate country of the British Commonwealth. It is ruled by a Governor and an Executive Council, with a Legislative Council mainly elected by the people.

Natural Regions.—Ceylon, though only a small country, must be divided into at least three natural regions :—

(1) The Hill Country, comprising the central mountain mass of the island, roughly the land over 1,000 feet.

(2) The Maritime Belt, or Coastal Plain of the east, south, and west.

(3) The Northern Limestone Plain, occupying the northern end of the island.

The Hill Country consists of a series of ridges, separated by deep valleys, running roughly from north-east to south-west. Very little is now left of the vast forests which covered this region before the days of European planting. The trees are nearly all evergreen, and get smaller the higher one goes, so that above 5,000 feet the trees are too small to be useful as timber. At intervals there are broad, marshy or grassy plains, like that of Nuwara Eliya and the Horton Plains, surrounded by mountains. The rainfall of most of the region is heavy ; the rain does not fall so heavily as on the plains, but is more continuous, and for days, or even weeks together, the sun may be hidden by dense clouds of mist. The greater part of the rain falls during the south-west monsoon, from June to October. Most of the rubber plantations are found in this region, especially on the western side, as well as nearly all the tea gardens. The latter are most numerous between Kandy and Nuwara Eliya. North and north-east of Kandy the cacao tree is grown, from which cocoa is obtained. Many of the valley sides are steep, but are very carefully terraced for the growth of paddy. A large amount of coffee used to be grown in Ceylon, but, as in South India, it is no longer important.

The old hard rocks which make up the mountain country are famous for gemstones, sapphires, spinel rubies, moonstones, etc. There are hundreds of small gem-quarries, especially where the gems have been washed out of the old rocks and into the gravels of the valleys, as around Ratnapura. Another important mineral is graphite, used for making lead pencils. The most important mines are in the Kurunegala district.

Kandy, the old capital, is in this region, and is reached by a wonderful hill railway from Colombo, 72 miles away. Nuwara Eliya is a well-known hill station.

The Maritime Belt is a broad belt below 1,000 feet, lying round the central mountain core. Over this stretch the old hard rocks are hidden by deep red soil of laterite. All along the coast, thrown up by wind and waves, there are lines of sand dunes. Just as on the west coast of India, large brackish lagoons are found behind the sandy ridges. The climate of the maritime belt varies greatly. The western and south-western sides get a heavy rainfall from the south-west monsoon, the south-eastern side is dry, whilst the eastern side is again wetter, receiving its rain largely in November and December from the north-east monsoon. The wet low country is thickly populated and widely cultivated, especially on the west and south-west of the island. The level lands and the

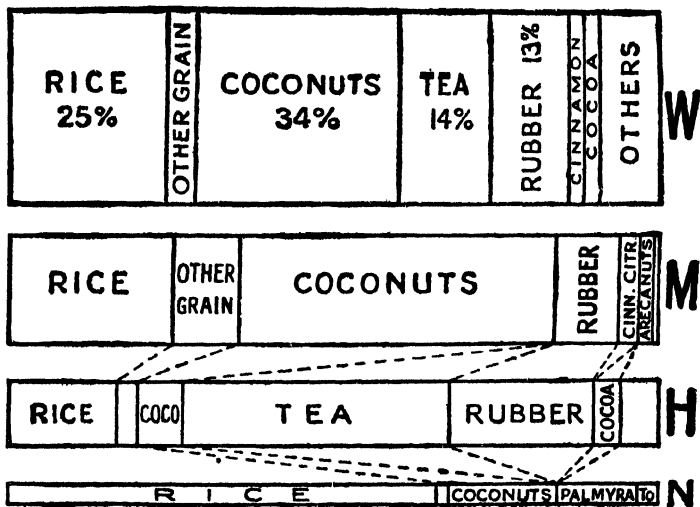


Fig. 462.—The crops of Ceylon.

W = the crops of the whole of Ceylon.
 M = the crops of the Maritime Region.
 H = the crops of the Hills Region.
 N = the crops of the Northern Region.

valleys are occupied by rice fields, yielding two crops a year, one after each monsoon. The higher lands towards the hills are covered by the mixed tree cultivation of the Sinhalese. Each farmer has coconuts, areca nuts, mangoes, breadfruit, together with yams and small plants like pepper. On the borders of the hill country are rubber and tea plantations. All along the coast are groves of coconuts and industries connected with the coconut find employment for a large number of people. The kernels are roughly dried for export as copra; even more important is the export of carefully dried or "desiccated coconut" prepared in factories; there are also factories for the preparation of coconut oil. The preparation of coir is mainly a cottage industry. Areca nuts are also grown for

export. Of the spices for which Ceylon has long been famous, cinnamon is the most important. The cinnamon tree likes a very light sandy soil, and grows in those parts of the maritime belt where such a soil is found. The industry is less important than formerly. The cinnamon of commerce is obtained from the inner bark of young shoots. Other spices are cardamoms, cloves, etc. Citronella oil, prepared from a grass, is obtained mainly in the south-west of the island. The parts of the maritime belt away from roads and railways, especially in the dry parts of the south-east and in the east, are very thinly populated, and there is much waste land. The railway across the island to Trincomali, opened in 1925, with a branch to Batticaloa, should do much to open the east coast.

Round the coast fishing is an important industry.

The capital of Ceylon—Colombo—is on the west coast, where a shallow bay afforded some shelter from the force of the south-west monsoon. Now a fine breakwater encloses an artificial harbour, and Colombo is not only the principal port of Ceylon, but a great entrepôt port also. Before the harbour of Colombo was finished, Galle used to be the principal port of call. It has a pretty natural harbour, but one with an exposed and dangerous rocky entrance, guarded by an old Dutch fort. Trincomali, on the north-east coast, has a fine large natural

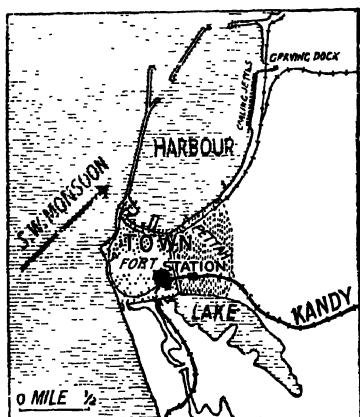


FIG. 463.—Sketch-map of Colombo Harbour, showing how it is protected from the South-West Mon-

soon. The harbour, but its hinterland is not important and the port is little used.

The Northern Plain covers the whole of the north of Ceylon. and does not rise more than 200 or 300 feet above sea-level. The plain is formed in the north by a pale limestone, covered by a thin bright-red soil. Round the coast are sand dunes. Most of this region gets about 40 inches of rain, but the soil is dry and poor, and there is much waste land covered with scrub jungle. The palmyra palm flourishes in this northern region. Cultivation is protected by numerous "tanks," mostly very old. Jaffna, situated on the Jaffna peninsula, is the most important town in this natural region. At the end of the Peninsula of Mannar is Talaimannar, the terminus of the Ceylon Government Railways, where steamers run daily to Dhanushkodi, 22 miles away, the terminus of the South Indian

Railway. South of the Mannar Peninsula is an area of shallow sea (the Gulf of Mannar) famous for its pearl fisheries.

Communications.—Colombo is the centre of the broad-gauge Ceylon Government Railways. One line runs southwards along the coast to Galle and Matara, whilst the main line runs north-eastwards through the old historical town of Anuradhapura to Jaffna, with a branch to Talaimannar. Another line runs from Colombo up to Kandy, and winds amongst the hilly country to Badulla, with a small branch to Nuwara Eliya. There are numerous excellent roads in Ceylon which link up outlying places with the railways.

TEA	RUBBER	COCONUT PRODUCTS	OTHERS
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FIG. 464.—The exports of Ceylon.

The Trade of Ceylon.—In value the trade of Ceylon is roughly the same as that of Karachi or Rangoon. Nearly all the trade passes through the great port of Colombo.

Ceylon has three main exports (see Fig. 464)—tea, coconut products, and rubber; others include areca nuts, citronella oil, cacao, and cinnamon. Although Ceylon has not a very large population,

RICE	COTTON GOODS	COAL	SUGAR	OTHERS
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FIG. 465.—The imports of Ceylon.

it does not grow enough food for its people, and imports much rice, especially from Burma. The other imports are similar to those of India.

INDO-CHINA

Between India and China there is a large peninsula projecting southwards. It is really a broad peninsula in the north (Indo-China) with a long narrow peninsula (Malay Peninsula) stretching southwards almost as far as the equator. The broad northern part, comprising Burma, the independent kingdom of Siam, and the French Colony of Indo-China has a typical monsoon climate; the narrow Malay Peninsula is in the equatorial regions.

SIAM

Siam is, on the whole, a lowland country, lying between the Tenasserim Yomas on the Burmese border and the mountains of French Indo-China. Siam has the same seasons as India. When the north-east monsoon is blowing Siam lies in the rain-shadow of

the Annamese Mountains, but from June to September the warm, moisture-laden winds blow up from the Gulf of Siam and deposit a heavy rainfall.

Rice is grown over the flat lands ; it is by far the most important crop, the staple food of the people, and the principal article of export. The hills of Upper Siam are forest-covered, and much teak is worked. The logs are floated down by river to Bangkok. In Lower Siam, lying between Lower Burma and Malaya, much tin and wolfram are produced. The Siamese are very similar to the Burmans, and are Buddhists. *Bangkok*, the capital and principal port, lies a few miles up the Menam¹ ; but the river is shallow, and has a sand bar near the mouth. There is a railway from Bangkok to the north of the country, and a railway runs right through to Singapore. As in Burma, the imports are cotton goods, foodstuffs, metals, and machinery. Most of the trade is with Hongkong, Singapore, India, and Great Britain.

FRENCH INDO-CHINA

French Indo-China comprises the small colony of Cochin China, and a number of states which are under French protection. The whole territory falls into three parts :

(a) The rich rice-growing lands of Cambodia and Cochin China, forming an extension of the alluvial plain of Siam, lie in the hinterland of the port of Saigon. This is one of the great rice lands of the world, and more than half the total crop is exported. Rice forms three-quarters of the total exports of French Indo-China. In the centre of Cambodia is a large lake, full of fish. Fishing is an important industry, fish forming the second article of export. *Pnom-Penh* is the principle town of Cambodia.

(b) The mountainous region of Annam, producing cinnamon, sugar, and tea, but of much less importance. Hué is the principal town, and Tourane the port.

(c) The Tonking Region, or hinterland of the port of Haiphong. This is another rice-growing area formed by the delta of the Red River. It has also rich mines of coal, tin, and zinc, as well as enormous limestone quarries, Portland cement being made from the limestone. Much raw silk is also produced. *Hanoi*, the capital of French Indo-China, is in this region.

MALAYA

Politically, Malaya, or the British sphere of influence in the Malay Peninsula, comprises three divisions. First there are the Straits Settlements—a number of isolated tracts of land including

¹ Actually Menam = river ; strictly the Menam Chao Phaya.

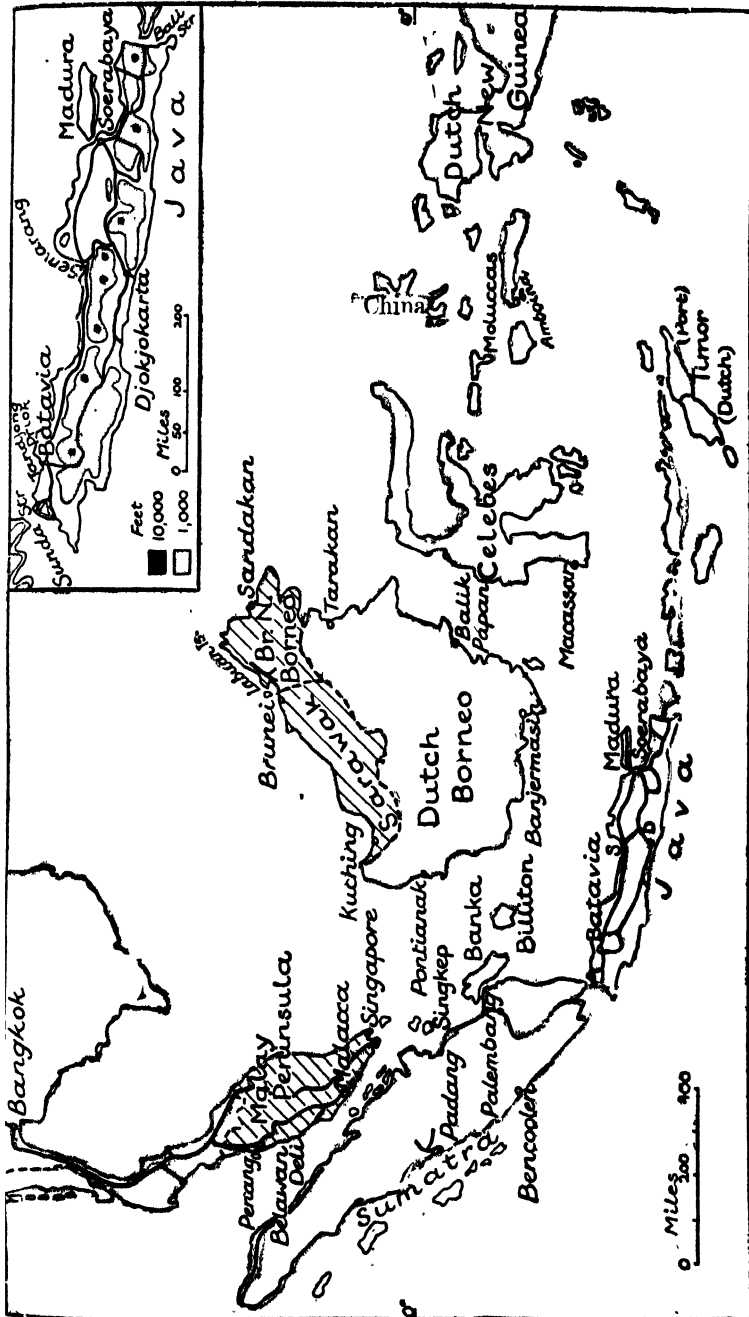


FIG. 466.—The East Indies.
British possessions lined. Nearly all the remainder (excluding the mainland) is Dutch. (From Anstey's Trade of the Indian Ocean.)

the important islands of Penang and Singapore. Secondly, the Federated Malay States (occupying the largest area), consist of a group of native states under British protection. Thirdly, there are some native states not included in the Federation.

Malaya has a backbone of high mountains, with several parallel ranges on either side. The western side is more developed than the eastern, for it is there that vast quantities of tin ore are found in the valleys. The three great products of Malaya are tin, rubber, and coconut products, and it is from these that the wealth of this prosperous region is derived.

The Federated Malay States have no good port, and most of the trade passes through Penang and Singapore. Like many British trading stations and harbours, the two principal ports of the Malay Peninsula—Singapore and Penang—are both on islands. The sheltered harbour of Penang lies between Penang Island and the mainland. Singapore Island is now connected with the mainland by a railway and a road, and its harbour is on the south of the island. There are nearly half a million people in Singapore, which is one of the world's great ports with a huge entrepôt trade.

The famous old spice port of *Malacca*, on the mainland of the peninsula, is now little used.

THE EAST INDIES

Except the north of Borneo, nearly the whole of the East Indies belongs to the Netherlands. The largest islands are Borneo and Sumatra, but the most important is Java, which has 42,000,000 people. The staple food grains of the people are rice and maize, but the crops grown for export are sugar-cane, coffee, rubber, coconuts, cinchona, tobacco, and manioc (from which tapioca is made).

There are important oil fields in Java and Sumatra, coal mines in Borneo, and tin is obtained from the small islands of Singkep, Banka and Billiton.

The principal town and port of Java is *Batavia*; other ports are *Sourabaya* and *Samarang*. The other islands are still largely undeveloped and partly covered with thick equatorial forest.

The northern part of **Borneo** is under British protection, and is divided into North Borneo, Brunei, Labuan. Coal exists, and there are oil fields, so the country is likely to develop; but at present the forests are the most valuable possession of the island.

The Philippine Islands lie to the north-east of Borneo, and have recently been given independence by the U.S.A. They lie outside the equatorial rain belt, and feel the influence of the monsoons. There are about 12,000,000 people in the islands. About one-eighth of the area of the islands is cultivated; the principal

crops are rice, manila hemp, coconuts, maize, sugar-cane, tobacco, and bananas. The Philippine Islands are amongst the foremost producers of copra and coconut oil in the world, whilst sugar, manila hemp, and tobacco are valuable exports. The islands do not grow sufficient rice to feed the people, and more is imported. The other imports are manufactured goods. The principal town and port is *Manila*.

THE CHINESE REPUBLIC

In 1912 one of the world's oldest empires— the Empire of China —became a republic. The old Chinese Empire included the rich, thickly populated region of China Proper and Manchuria, together with the huge but less important “ outer territories ” of Sinkiang or Chinese Turkistan, Tibet, and Mongolia, the last two largely desert. Nominally the present republic covers the same area, but the central government with its capital since 1928 at Nanking (replacing Peiping or Peking) has never yet been strong enough to control the whole. Under Japanese influence Manchuria has been declared an independent state named “ Manchukuo.” The whole area of the old Empire was about $4\frac{1}{4}$ million square miles, of which China Proper was about 1,533,000 and Manchuria 364,000 square miles.

CHINA PROPER

Position and Size.—China is about the same size as India, and has at least the same number of people, probably more. Actually, however, one is justified in saying that China is much more densely populated than India for the proportion of habitable land is much less. China, in contrast to India, lies almost entirely outside the Tropics. The Great Wall of China, built thousands of years ago by the Chinese as a protection against raiders from Mongolia, still marks roughly the northern limit of China Proper. Until 1907 China Proper consisted of eighteen provinces, but in that year the three Manchurian Provinces, formerly a separate dependency, were united as the Viceroyalty of the three Eastern Provinces under China Proper.

Physical Features.—Broadly speaking, China Proper lies to the east of the great series of plateaus which constitutes the heart of the continent. Excluding Manchuria, the country may be considered as consisting of three great river basins—the basins of the Hwang Ho, the Yangtze Kiang, and the Si Kiang. These fundamental geographical divisions are useful because they correspond with the popular division of the country into North China, Central China, and South China. The Hwang Ho and the Yangtze Kiang both rise amidst the mountains of the high plateau of Tibet, and their upper courses lie outside China Proper. Nearly the whole of the Si Kiang basin, on the other hand, lies within the confines of

China itself. In the north-west China includes a considerable portion of what is geographically a part of the Mongolian plateau. Separating the Hwang Ho and the Yangtze basins, and the Yangtze and Si Kiang basins are important offshoots of the central mountainous mass of Asia.

Geology and Minerals.—Broadly speaking, the south of China, is constituted by a massif of old rocks, but coal-bearing rocks occur in basins amongst older rocks; the south of China includes larger



FIG. 467.—The natural regions of China.

stretches of sedimentary rocks. Though as yet little developed there is no doubt that China is very rich in minerals. China may be regarded as one of the first coal countries of the world, and coal occurs in most of the eighteen provinces as well as in Manchuria. The total output is estimated, however, at only 30,000,000 tons, of which two-thirds are from modern mines. The huge field underlying Shansi and part of Shensi probably rivals the Pennsylvanian field in size and potential importance. Part of the Shansi field is anthracitic. Iron ore is abundant in the latter field and is also important in Chihli.

Shantung, and other provinces. Amongst the leading deposits now being worked are those of Tayeh, near Hankow. China's present output of iron ore is only about 1,500,000 tons a year. It is interesting to notice that modern coal and iron ore mining is practically restricted to the area served by railways. A little petroleum is obtained in Shensi, but conditions generally are not suitable in China. Yunnan Province is probably one of the richest copper districts in the world; tin is mined in south-western China. China has almost a world monopoly in the production of antimony—two-thirds of the world's total, mostly from Hunan. Gold, silver, lead, molybdenum and bismuth are amongst other minerals produced in China.

Climate.—In winter atmospheric conditions in China are dominated by the mass of cold heavy air over the heart of the continent. In contrast to India, China is not shut off from the interior by any great chain of mountains. Consequently in winter strong, cold winds bear outwards from the interior. Over Northern China they are particularly strong, giving rise to the well-known and much hated dust storms. The whole of Northern China is below freezing in winter, the January isotherm of 32° F. reaching its southernmost limit in the Northern Hemisphere. Frost and snow are usual, except in Southern China. Except along the Yangtze Basin, where winter cyclones give rise to a little rain, and along the S.E. coast, the cold season in most of China is one of clear skies and rainlessness.

In summer, depressions form in the interior and the summer monsoon blows in from the south and south-east—warm and moist. The summer winds are rarely as strong as the winter winds—a direct contrast with India—but May to September is the rainy season, as in all parts of monsoon Asia. In July there is little difference in temperature between North China and South China. Peking averages 79°, Hongkong 82°.

China thus falls into four climatic provinces, which correspond with the physiographical divisions:

South China has a tropical monsoon climate, but with colder winters than are experienced in India.

Central China has cold winters and warm, wet summers, but with local winter rains.

North China has winters below freezing, with strong dust-laden winds and hot, wet summers, but with a rainfall generally below 40 inches.

Manchuria has still colder winters and cooler summers.

Natural Vegetation.—In few countries of the world has the natural vegetation been removed as completely as it has over much of China. The barren, eroded hills so characteristic of much of China suggest a rocky desert country rather than one which should, properly, be clothed with good forest growth. Only in a few parts,

such as the hills of the south-east, is there still a good forest growth.

Agriculture.—Like India, China is essentially an agricultural country and is, broadly speaking, self-supporting in the matter of foodstuffs. But China includes a far larger proportion of moun-

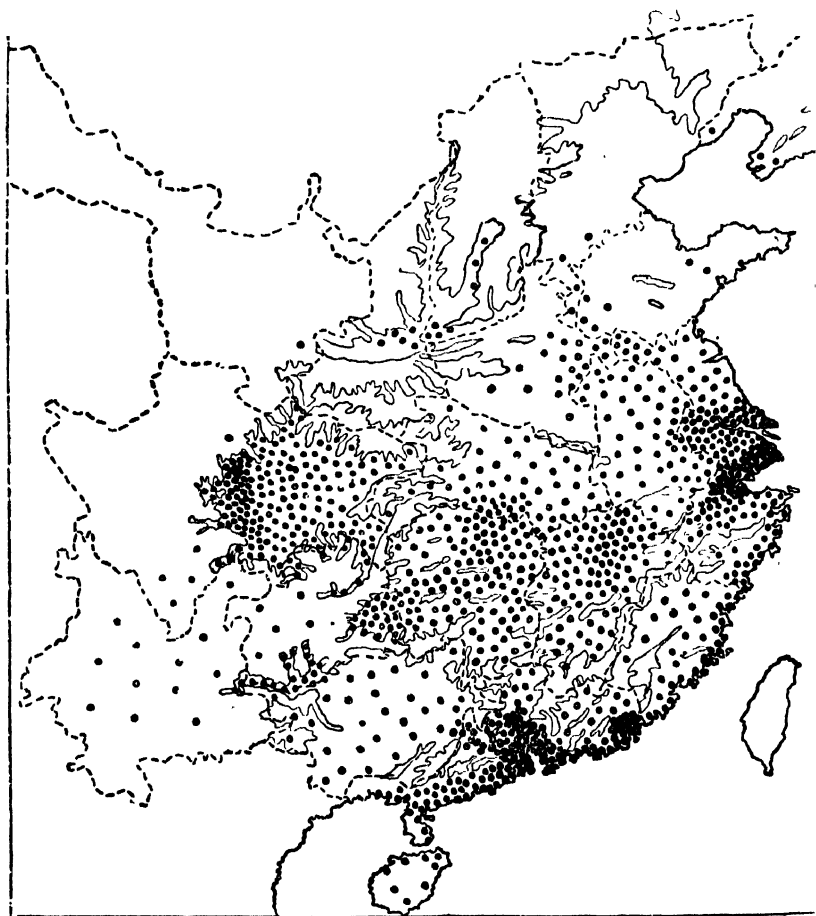


FIG. 468.—The distribution of rice in China.

Each dot represents approximately 50,000 acres with a total of 50,000,000 acres. Nearly all the rice is where the land is under 3,000 feet (the light line is the 3,000 feet contour line), and in the centre and south of China (Yangtze and Si Kiang basins). (In part after *Le Fleur, Foscue, and Baker.*)

tainous country not suitable for agriculture than does India, with the result that the valleys and other fertile regions are very densely populated. It is estimated that in some areas 3,000 people and 1,000 animals find their sustenance in a single square mile of land. Taking China as a whole there is rather less than 0·4 acre of cultivated land

per person. The two great achievements of the Chinese farmers have been the maintenance of soil fertility and the development of a highly specialized system of crop rotation. The former has been accomplished largely by the utilization to the utmost of human manure and by such laborious processes—possible only where labour

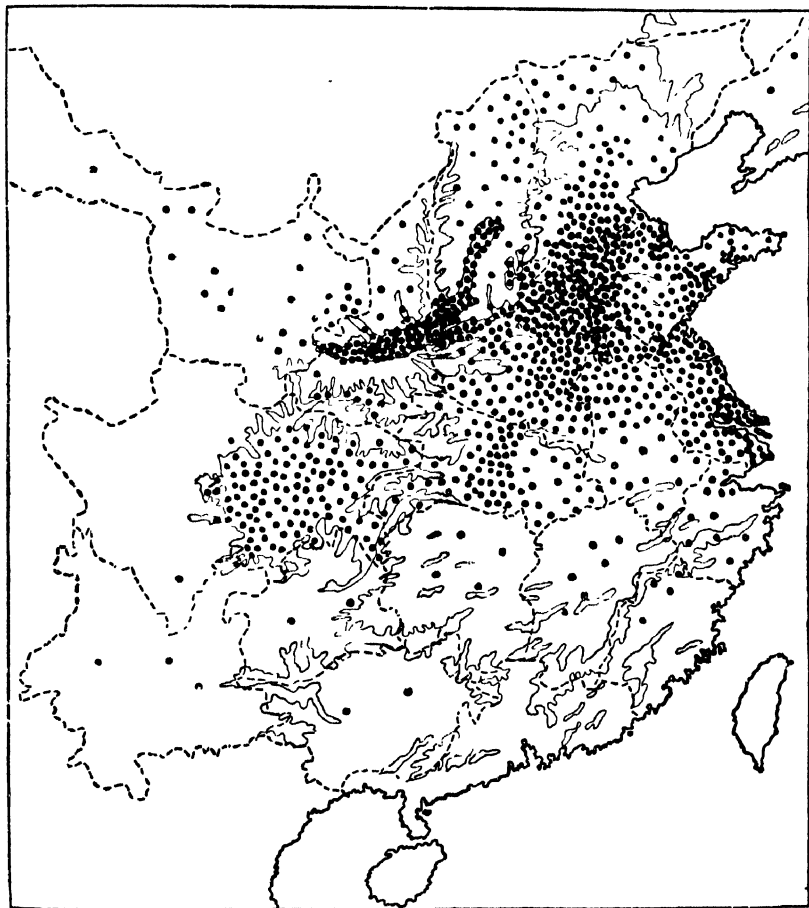


FIG. 469.—The distribution of wheat in China.

Each dot represents 50,000 acres out of an estimated total of 52,200,000 acres. Notice that most of the wheat is in the low ground—below the 3,000 foot contour which is marked—and in North China. (In part after *La Fleur, Foscoe, and Baker.*)

is super-abundant—as the actual mixing by hand of different soils. Every farm is really a large garden and not only is multiple cropping adopted but every spare inch of land is utilized.

Three-quarters of all the cultivated land in China is occupied by the three chief food grains—rice, wheat, and millet.

Rice is the dominant, almost the sole food crop in Southern and

South-Eastern China. The yield averages 1,750 lb. per acre. In Central China rice and wheat share the premier position as food grains; in Northern China there is little rice.

Wheat.—Very little wheat is grown in Southern China; in Central China it is an important crop; in Northern China and Manchuria it tends to become the leading crop.

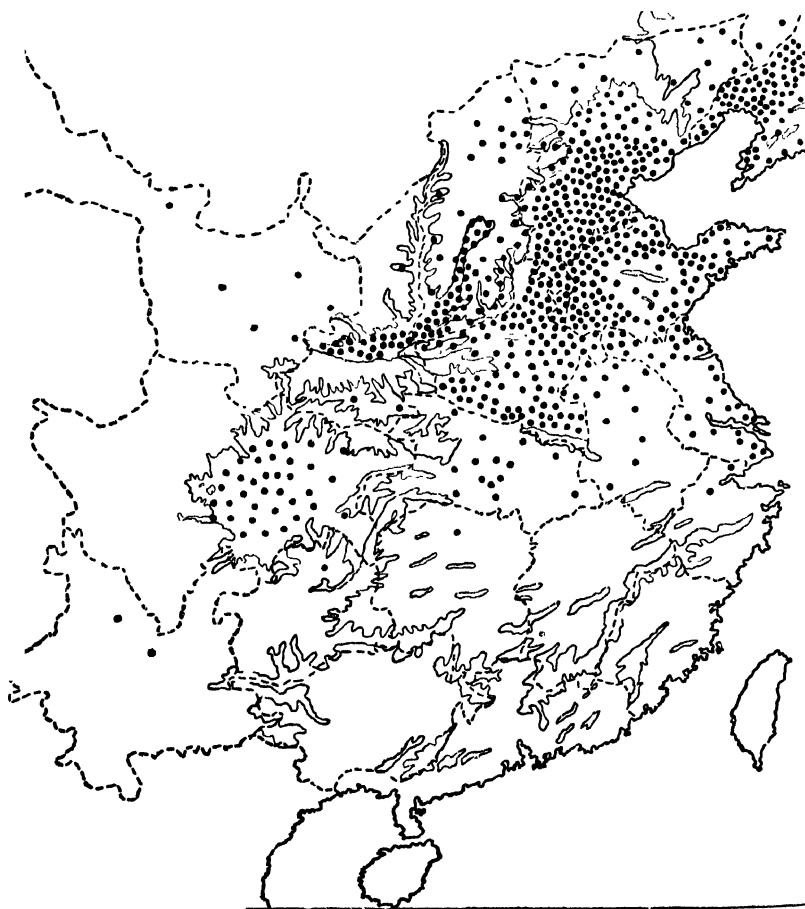


FIG. 470.—The distribution of millet in China.

Each dot represents 50,000 acres out of a total of 35,000,000. Millet, like wheat, is almost restricted to North China. (In part after *La Fleur, Foscue, and Baker.*)

*Millet*s tend to become the dominant grain where the rainfall is less than 40 inches per year, being concentrated in Northern China and Manchuria. The better lands in these drier tracts are occupied by wheat, and soya beans now occupy much of the land formerly given to millets.

Other food crops in the south include sugar ; in the north maize, peas, and beans. Tea is cultivated in the south and west.

Cotton is grown widely in Central and Northern China, the chief area of production being the Yangtze valley.

Other fibre crops include hemp, jute, and ramie. Mulberries and oaks are reared for agricultural purposes.

Animals.—The nine million horses and mules in China and Manchuria are mainly in the drier north where they can be used as pack animals. Cattle in China are primarily draft animals, since the Chinese use little beef and make but slight use of milk or dairy produce. Fat pork, on the other hand, is a favourite foodstuff, and there are estimated to be 60,000,000 pigs in China. Sheep, primarily reared for their coarse, inferior wool, are most numerous in the north and west. Poultry are abundant and egg products form a leading item of export. Sericulture is especially important in Central China and Shantung, and China probably produces more silk than the whole of the rest of the world (see Chapter IX, in Part I).

Manufactures.—Native looms are found in most Chinese villages, but an important feature in the development of modern China is the erection of cotton, wool, and silk mills in Canton, Shanghai, and other great centres. A large proportion of the cotton-mills are Japanese owned. Cotton goods are now exported. Flour-mills are becoming important. Amongst other industries mention must be made of the great Chinese iron-works at Hanyang, near Hankow, using the Tayeh iron ores.

Population.—A census, as understood by western nations, has never been taken in China, and it is difficult to know the exact population. In China proper and Manchuria, it almost certainly exceeds 400,000,000. Two factors control the distribution of the population. One is physical—most of the population is concentrated below the 2,000-foot contour line. The other is religious. Although the Chinese are nominally Buddhists or Confucianists, the real pivot of their religion is ancestor worship. This ties a family to the burial places hallowed by the remains of its predecessors and thus greatly deters emigration and movement. The typical undivided Chinese family is symbolical of the same national trait. In many areas overcrowding results in utmost poverty and frequent famines, but only the Cantonese or the Chinese of the south-east coast are able to tear themselves away from home ties and seek fortunes abroad. Thus the vast open spaces of Manchuria or Mongolia are being but slowly developed.

Communications.—The Yangtze and its tributaries form the great highway of communication in Central China ; the Grand Canal and the network of small canals in the Yangtze delta and northwards to the Great Plain. In South China the Si Kiang is

important. The railway system is still quite inadequate, though the long-promised connection between Hankow and Canton was completed in 1936. Over most of the interior primitive forms of transport by human porters and by wheelbarrows are the only means available, but remarkable progress is being made with road making. Motor buses ply regularly between many of the larger towns. Regular air services now link towns which were previously days or even weeks apart.



FIG. 471.—The railways, navigable waterways, and canals of China.

Foreign Trade.—All the foreign trade takes place through the Treaty Ports and, like that of India, is nearly all sea-borne. Shanghai, Canton, Tientsin, and the south-eastern ports have the lion's share of the trade. Fig. 473 shows the contrast between the exports in 1921-25 (including Manchuria) and in 1933 (excluding Manchuria). The relative importance of tea has dropped enormously since the early days of European trade with China. Most important

among imports are cotton, metals, machinery, and rice. The disturbed state of China in recent years makes it especially difficult

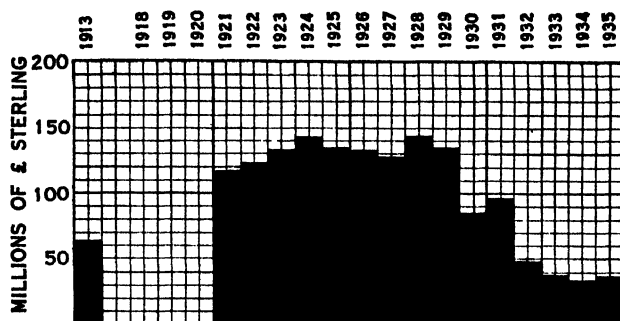


FIG. 472.—The exports of China.

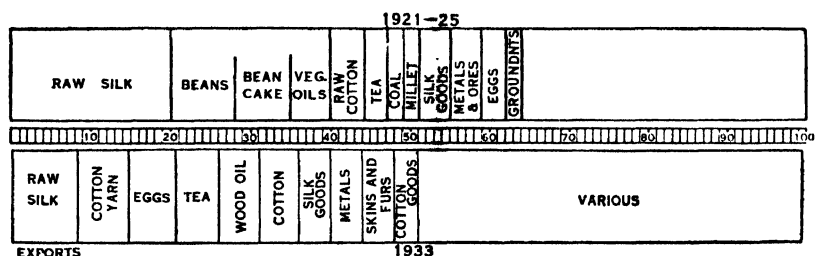


FIG. 473.—The exports of China.

to generalize regarding the direction of Chinese foreign trade. In 1925 40 per cent. of the trade was with Japan ; 26 per cent. with

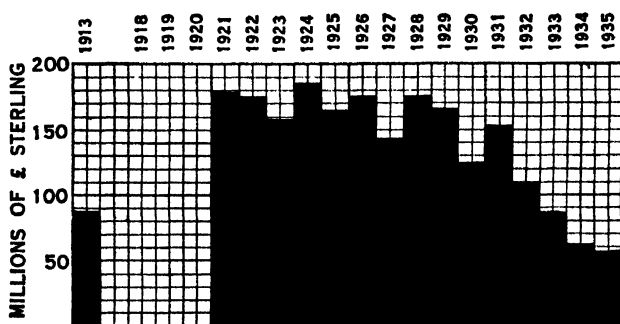


FIG. 474.—The imports of China (net imports). *

Great Britain and Hongkong ; 9 per cent. with the United States. In 1931 Japan's share dropped to 23 per cent.

THE NATURAL REGIONS OF CHINA

The Loess Plateau of the North-West (Shansi, Northern Shensi, and Kansu).—In the north-west of China the original topography of the country has been obliterated by a great mantle of wind-blown dust or loess, through which only the higher ranges of hills appear. Each loess-filled basin forms a “hsien” or county, with the county town in the centre. Rivers and roads alike have cut deeply into the soft loess, and the loess plateau has become a land of sunken roads which, viewed from the surface, appears uninhabited except for an occasional cultivator; for the dwellings are dug out of the loess walls of the roads—warm and dry in winter, cool in summer. The natural fertility of the loess is great, but the rainfall is irregular and this part of China is less densely populated than most.

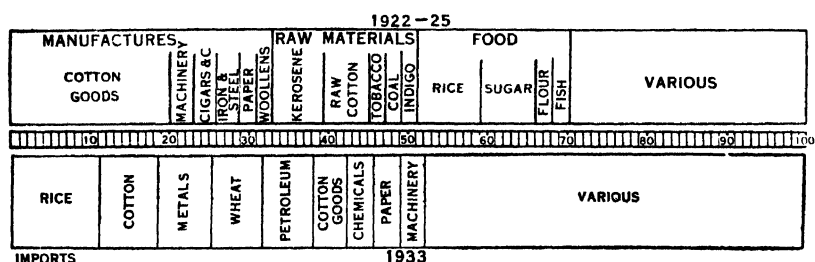


FIG. 475.—The imports of China.

The Wei Ho Valley.—This small but important region lies between the loess-covered plateau to the north and the Tein-ling mountains to the south; occupying the central part of Shensi round the provincial capital of Si-an. A fertile, loess-covered valley, the special claim of this densely populated area is that it claims to be the cradle of Chinese civilization.

The Great Plain of North China.—Lying between the edge of the loess plateau on the west and the Gulf of Pe-Chih-li or the Shantung highlands on the east, the Great Plain of North China occupies a large part of the province of Chihli, the western portion of Shantung, and the north-east of Honan. Originally occupied by a shallow sea, the plain is built up of a series of marine gravels with a superficial coating of alluvium. The latter consists really of re-deposited loess laid down by numerous streams, including the Hwang Ho itself, which flow down from the plateau. In their passage across the plain there is but a slight fall and the great burden of fine sediment is deposited in the bed of the river. In order to confine the rivers, mud and straw embankments, sometimes faced with masonry, are built on either side and gradually the rivers come to flow between high banks and the water-level is well above that of the surrounding plain. Breaches resulting in disastrous floods

and constant changes in the courses of the rivers are inevitable. The rivers are a curse rather than a blessing, and the name of China's Sorrow, often applied to the Hwang Ho, is indicative of the state of affairs. But the fertile soil and the hard cereals (millet and wheat) afford a more nutritious diet than the rice of the south. Further, the vigorous winters have helped to make the Northern Chinese a fine sturdy people. In the days of old the Chihli plains were continually the prey of Mongol raiders from the plateau, but now it is the plain dwellers who are the aggressors and are pushing settled agriculture further and further on to the plateau. *Kalgan* is the centre of this new agricultural land. The position of *Peking* demonstrates the fear with which the raiders used to be regarded and which necessitated the building of a capital in such a position as to serve as a base against them. *Tientsin*, on the navigable *Pei Ho* is the principal port of the Great Plain.

The Shantung Peninsula.—The Province of Shantung, excluding the western strip which forms part of the Great Plain of North China, consists of a mass of ancient mountains rising like an island from the plain on the west and the sea on the east. The commanding position of the Peninsula and the excellence of the few natural harbours in its rocky coast attracted the attention not only of Russia and Japan but also of the European powers who had interests to protect in the Pacific. Germany transformed the fishing village of Tsing-tao into a great port; the British leased Wei-hai-wei as a protective measure against the Russian occupation of Port Arthur. The hills of Shantung are barren and almost completely deforested; the valleys are densely populated and intensive agriculture is practised to the full. Sericulture is important. The sturdy Shangtungese emigrate temporarily to Manchuria and to Shanghai, and are more mobile than the Chinese of the interior.

The Szechuanese Alps.—The mountainous regions of the far interior are very sparsely populated by comparatively primitive people.

The Red Basin.—Occupying the heart of the province of Szechwan, the Red Basin is one of the most remarkable natural regions in the world. Hemmed in on all sides by a girdle of mountains, the basin was occupied in Tertiary times by a great lake in which were laid down the red sandstones from which the basin derives its popular name. When the lake was drained the outflowing stream cut the famous gorge between Kwei-chow and I-chang. The numerous streams in the basin have cut deep gorges through the sandstones into the old rocks below. The four leading north and south valleys comprise the richest agricultural land of the "Province of the Four Streams" (Szechwan). The whole of the Red Basin, with the exception of the Chengtu plain, is thus divided up into steep-sided ravines and ridges. But it is well watered, and

the hillsides have been terraced from base to summit. The farmers of this densely populated region produce a varied succession of crops—rice, wheat, maize, beans, sugar, hemp, and tobacco, whilst oranges are widely grown, and silk is one of the leading products of the region. Despite its interior situation, the climate of the Red Basin is warm and damp and the winters are milder than in most parts of China. Coal is abundant and crops out on the hillsides.

Though lying within the limits of the Red Basin, the Chengtu plain is distinctive in character from the remainder, and consists of a broad irrigated plain watered by the Min River. The density of population made possible by irrigation is almost incredible—more than 4,000 to the square mile in places.

The most remarkable feature of the whole Red Basin is its inaccessibility. Almost the only exit or entrance is by the Great Gorge and the region as a whole is self-contained and self-supporting.

The Central Basins.—It is probable that the waters of the Yangtze, emerging from the gorges which cut off the Red Basin from the rest of China, originally found their way to the Pacific Ocean through a series of lakes. The flat alluvial stretches of the Central Basins represent the floors of these infilled lakes. In each of them, indeed, there still exists a fragment of the ancient lake and in times of severe flood the whole countryside reverts again to what must have been its prehistoric character.

The Upper Basin is the largest and lies to the north and south of the Yangtze, partly in Hupeh and partly in Hunan.

The Middle Basin is similarly divided into northern and southern portions by the Yangtze.

The Lower Basin is less distinct and lies mainly north of the river.

The basins are surrounded by a tangle of mountains stripped bare of their original forest cover. Broadly speaking, wheat, barley, or cotton are dominant crops to the north of the Yangtze; rice to the south; tea and oilseeds grow on the slopes of the surrounding hills. The great highway of the natural region is the Yangtze and the whole centres on the great triple city of Hankow-Wuchang-Hanyang.

The Yangtze Delta.—The delta corresponds roughly with the province of Kiangsu. The whole is a vast alluvial plain and has been described as the "Holland of China" being traversed by canals in all directions. The principal food grain is rice, but mulberry trees line the canals, and this is the leading silk region of China. Much cotton is also grown and supplies the Shanghai mills as well as a surplus export to Japan. *Nanking*, the present capital, and the great port of *Shanghai* (just off the mouth of the Yangtze) are the two chief centres of the region.

The South-East Coast.—This region corresponds roughly with the provinces of Chekiang, Fukien, and eastern Kwangtung.

Backed by high mountains, the region is geographically isolated ; the outlook of the people is towards the sea ; in customs, as well as in many other ways, they stand apart from the rest of the country. Rice is the crop in the valleys ; tea gardens, orange, lemon, and mulberry groves cover the lower terraced slopes of the hills, the higher parts of which are still forested. Ningpo, Foochow, Amoy, and Swatow are the chief towns and ports, and from these there is a stream of emigration to Malaya and the East Indies.

The Si Kiang Basin.—The entrance to this great region is guarded by Canton and Hongkong. It is the great rice-growing area of China ; densely populated valleys are surrounded by bare deforested hills. Canton was affected by foreign trade long before the remainder of China was open, and most of the Chinese found abroad are Cantonese or southern Chinese.

The Yunnanese Plateau.—Yunnan is a wind-swept plateau about the size of the British Isles but with a population of only 6 7,000,000. The valleys are fertile but unhealthy, so that the cultivators often live in villages perched high above their fields. The natural resources are great—especially in minerals—but are as yet but little touched.

MANCHUKUO or MANCHURIA

Manchuria is a large territory, three times the size of the whole of the British Isles, that lies to the north of China and Korea. In the Middle Ages the country was inhabited by wandering tribes of Manchus. Some of these Manchus were very fierce and warlike, and they conquered the whole of China. Making their capital at Peking, the Manchu dynasty ruled the Chinese Empire for many hundreds of years until the Empire came to an end in 1912. Thus it was that Manchuria, the land of the conquerors, became united with China Proper. But there is no longer a Manchu population in Manchuria. A few scattered communities alone remain. The 30,000,000 people in the country are mainly Chinese, with a few Japanese ; and so the Chinese claim Manchuria as part of China. But the wonderful progress which Manchuria has made in recent years has been done almost entirely with the help of the Japanese and with Japanese money. The people of the small, crowded, and mountainous islands of Japan would starve if they could not get food supplies from abroad, and it is the food supplies from Manchuria that Japan needs very badly, together with coal, iron, and other minerals. So, with the help of the Japanese, Manchuria has declared itself an independent country under the name of Manchukuo.

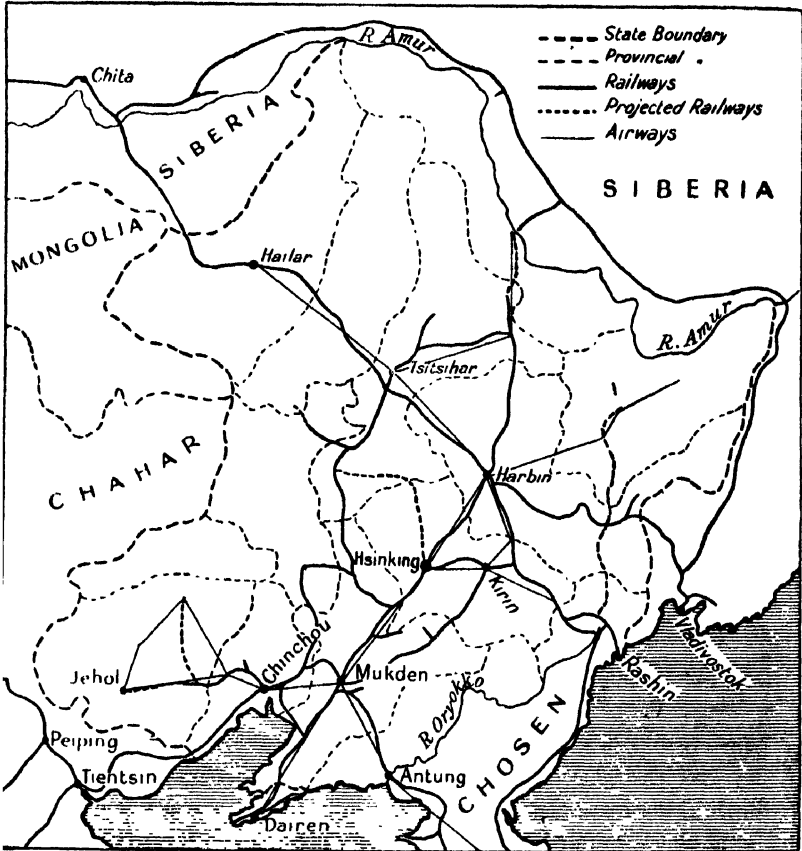


FIG. 475A.—Map showing the communications of Manchuria.

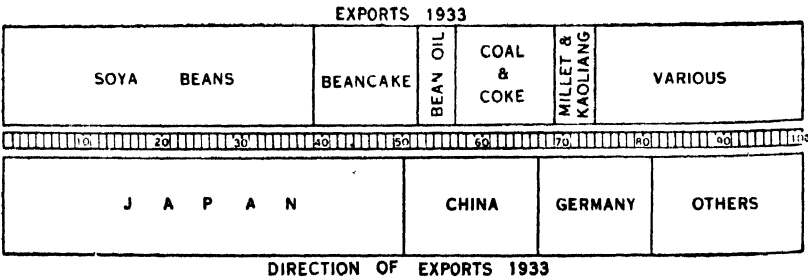


FIG. 475B.—Manchuria : exports and direction of exports.

Manchukuo has been divided into provinces, and the chief towns are Moukden, the capital, with nearly half a million people, Kirin, and Harbin. But geographically Manchuria should really be divided into three regions—the eastern and western hills and the central plain. The climate of the plain is not unlike that of the Canadian prairies, with very cold winters, hot summers, and a rainfall mainly in the early summer. There is still plenty of room for more people and there are vast opportunities for development, and Manchuria is rapidly becoming one of the world's great granaries. Millet and wheat are the great food crops, together with beans, the latter grown largely for export. Perhaps we cannot realise how important the beans—soya beans—can be ; but they yield a valuable oil which can be used in cooking and in the manufacture of soaps, margarine, and a very large variety of foodstuffs, whilst the beans from which the oil has been crushed out give a valuable cattle cake. So bean cakes, beans and bean oil form more than half of all the exports of Manchuria. The other products exported are wheat, other cereals, coal and timber, about two-thirds of all the exports going to Japan. Every year large numbers of Chinese immigrants arrive in Manchuria from the over-populated parts of China. Although the Japanese have spent much money in developing the country, by building railways, roads, hospitals, towns, working mines, etc., there are not many Japanese settlers because the Japanese do not like the hard climatic conditions. Japan needs the food and raw materials which Manchuria can supply. The Japanese built and own the South Manchuria Railway, which has done for Manchuria largely what the Canadian Pacific Railway did for Canada in opening up the country. There are other railways, and altogether the length of lines is about 5,000 miles, so it is wrong to think of Manchuria as a wild, undeveloped country. The South Manchuria Railway runs into the Kwang-tung Peninsula, which, with the ports of Port Arthur and Dairen, belongs to Japan. The most important town is Moukden, whilst Harbin lies farther north on the North Manchuria Railway, which connects with the Trans-Siberian Railway.

CHINESE OUTER TERRITORIES

Mongolia is a vast area in the centre of Asia, larger than the Indian Empire, but with fewer people than the city of Bombay. It consists mainly of the great desert of Gobi or Shamo, with a surrounding fringe of grass land. It stretches from the mountains on the frontier of Siberia to China. The people are nomads, wandering about with their flocks of camels, horses, and sheep. Much of the land is fertile and only irrigation is required to make it productive.

Settlers from China are commencing to cultivate some of the border tracts near China. Some parts are known to be rich in minerals. The principal trading centre is *Urga*, which is now reached by motor-cars from *Kalgan*. Mongolia is now more under the influence of Soviet Russia than of China.

Tibet occupies the bleak barren plateau north of India. About 2,000,000 people are believed to live in the region; they are divided into Lamas, or monks, and the lay people. The head of government is the Dalai-Lama, who lives at *Lhasa*. For a very long time foreigners have been prevented from entering the country, and large parts are still unexplored. Within recent years, much of the country has been opened to British trade.

North of Tibet lies the province of Sin-kiang, including Chinese Turkistan. The two principal towns are *Kashgar* and *Yarkand*. About these two towns the land is irrigated and the country is increasing in prosperity.

HONGKONG

Near the mouth of the Canton, or West River, lies the small island of Hongkong, which has been a British Possession since 1841. The island is separated

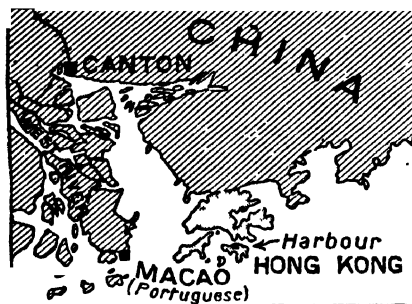


FIG. 476.—The position of Hongkong.

from the mainland by a strait only half a mile wide, and on the shore of the mainland is Kowloon, part of the colony. In addition a considerable piece of the mainland has also been leased to Great Britain. The strait between the island and the mainland forms a wonderful harbour, and Hongkong is visited by 25,000 vessels yearly. Hongkong is a free

port, there are no customs duties, and much of the trade of South China passes through Hongkong. The trade of Hongkong is normally as large as that of the whole of South Africa. It was over £150,000,000 in 1923. The rich Chinese merchants are safer there under British rule than in China, and more than 850,000 Chinese live on the island or in Kowloon. There are also shipbuilding yards, sugar factories, tin refineries, and tobacco factories.

THE JAPANESE EMPIRE (NIPPON)

The island kingdom of Japan has often been called the "Britain of the East." Both Britain and Japan are groups of islands in temperate regions, lying one to the north-west and the other to the

north-east of the great land mass of Eurasia. Japan Proper consists of four large islands, forming a long curve from north-east to south-west. But included in the Japanese Empire are half the island of Sakhalin in the north, a string of small islands terminating with the large island of Taiwan in the south, and the large Peninsula of Korea on the mainland of Asia. The total area of the Empire is 261,000 square miles. Japan proper is 56·3 per cent. of this area; Korea is nearly a third; Taiwan 5·3 per cent.; Karafuto 5·3 per cent. The total population of the Empire in 1930 was 90,400,000, including 64,500,000 in Japan Proper, 21,100,000 in Chosen (Korea), and 4,600,000 in Taiwan.

JAPAN PROPER

Position and Size.—Japan Proper extends from 30° N. to 45° N., but running through the island of Taiwan (Formosa) is the Tropic of Cancer, whilst Japanese territory in Sakhalin extends to 50° N. The Japanese Empire thus covers a wide latitude, but the whole is nearer the equator than are the British Isles; 135° E. runs through the centre of the kingdom. The largest island of Japan (Mainland, or Honshu) is almost exactly the same size as the largest island (Great Britain) of the British Isles, but Japan Proper is larger than the British Isles, and the Japanese Empire has more than twice the area of the British Isles. Honshu is a third of the whole Empire; Hokkaido 11·6; Kiushu 6·0, and Shikoku 2·7 per cent.

Physical Features.—Nearly all parts of Japan are mountainous, and at first sight the arrangement of the mountains is irregular. Broadly, however, two parallel chains of mountains may be distinguished, each forming a long curve. The one curve lies close to the west coast, the other to the east coast. The midland valley which lies between the two chains is most clearly marked in the south-west, where it is occupied by the famous Inland Sea. Elsewhere it is obscured by great volcanic piles, the volcanoes showing a tendency to lie along lines at right angles to the folded chains. There are numerous volcanoes in Japan; the most famous being Fuji Yama (Mount Fuji) over 12,000 feet high, and the sacred mountain of the Japanese. Many other peaks rise to over 7,000 feet. Japan is, then, a very mountainous country—indeed, the only extensive plain lies around Tokyō. As a result only about $\frac{1}{5}$ of this densely populated country is capable of cultivation.

Geology and Minerals.—The geology of Japan is complex; associated with the sedimentary rocks are coal fields and anthracite fields, as well as some small oil fields, whilst metalliferous deposits are associated with the plutonic intrusions of the folded chains and with the volcanic areas.

Coal occurs in two main areas; in the island of Hokkaido in the

north, of which Hakodate is the port; in the island of Kiushu in the south, of which Nagasaki is the port. The output is about 30,000,000 tons annually—insufficient for home needs.

Petroleum is mined chiefly in a field near the west coast about 400 miles north of Tokyo. The output is insufficient for home needs.

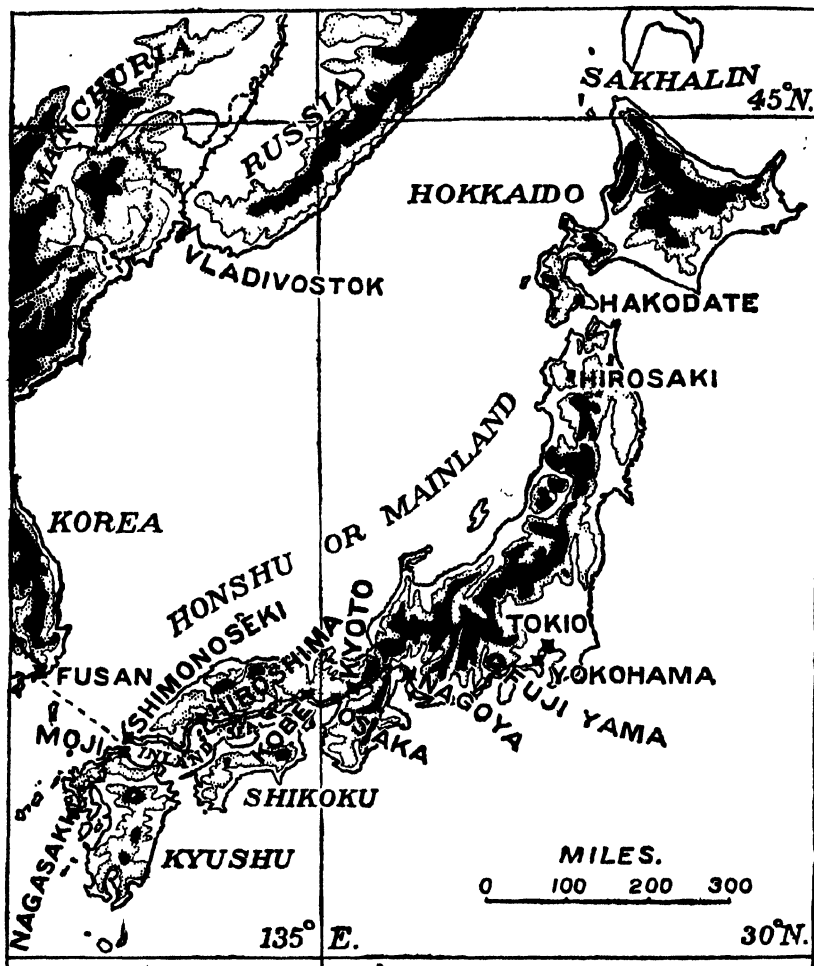


FIG. 477.—Japan.

Copper is mined in several areas, and Japan figures as the world's fifth largest producer. As in other countries, the production has varied considerably in recent years; it averages 175,000,000 lbs. Other mineral products include gold, silver, zinc, sulphur, lead and tin.

Climate.—In general, the climate—or more correctly the climates

—of Japan is comparable with that of China, but modified locally by Japan's insular position. As in China, there are strong north-west winds in winter, and feebler south-east winds in summer.

In winter the Japanese archipelago is warmer than corresponding latitudes on the mainland, and the country is divided roughly into northern and southern halves by the January isotherm of 32° . Although the west coast is exposed to the full force of the cold winds from the Asiatic mainland it is warmer than the east coast. The explanation of this surprising fact is found in the ocean currents. An important branch of the warm Kuro Siwo hugs the west coast, but the other branch is separated from the east coast by a wall of cold water. Winter temperatures (January averages) range from 15° in the interior of Yezo to 45° in the south of Japan where the winters are mild. Over most of Japan the winter is dry, though not so dry as in north China. In crossing the Japan Sea the north-west winds, however, pick up a considerable amount of moisture and give a heavy precipitation, mainly in the form of snow, as they rise to cross the mountains. Some localities on the west coast have thus a greater rainfall in winter than in summer.

In summer, the July temperatures decrease steadily from just below 80° in the south to 60° in the north of Yezo. The monsoon rainfall has two maxima, one in June and July, the other about September.

Japan is sometimes compared with the British Isles as regards climate, but in reality a comparison with the New England coast is more apt.

Forests and Forestry.—Although a comparatively small proportion of the surface of Japan is suitable for agriculture, much of the land is forested, and Japan's forests form one of her great assets. Forests cover more than two-thirds of the country: 20,000,000 acres are privately owned; 3,000,000 acres belong to the Imperial Household, and 18,000,000 acres to the State. The forests are mainly of soft-wood trees (pines), and are scientifically controlled. Nevertheless, Japan figures on the balance as an importer of wood.

Agriculture.—Every available piece of land which can be used is used for agriculture in Japan, but even then there are only 18.7 million acres of cultivated (including a small proportion of pasture) land to support a population of 64,000,000. This may be compared with 25.7 million acres of cultivated land in England and Wales with 38,000,000 people. Thus, although intensive cultivation is assiduously practised, Japan is becoming more and more dependent on foreign supplies of foodstuffs. Therein lies the importance to Japan of the undeveloped lands of Manchuria. In order to economize valuable land, villages are often built on steep hillsides and the hill is cut into tiny fields. Three-quarters of the arable land is cultivated by peasants. The principal food grain is

rice, which can be grown all over the south because of the higher summer temperature, and which covers more than 40 per cent. of the total cultivated land. Wheat, barley, and rye (rye in the cold north) together cover as much ground as rice. The other important crops are tea and tobacco. Japanese tea is different from that of India or Ceylon. A large proportion of the tea is exported to the United States, where it is more in vogue than in other parts of the world. Considerable numbers of cattle, nearly 4,000,000, are kept, but Japan is so carefully cultivated that there is little land left for sheep or goats. Large numbers of mulberry trees are grown for the sake of the silkworms, for the production of silk is a very important industry. The silkworms are reared by the same farmer who farms wheat, an interesting example of mixed farming. Japan produces 75 per cent. of the silk of the world (not including China).

Fishing is an important occupation of the Japanese, and they have invented a wonderful process whereby oysters are made to form natural pearls, and large numbers of these "culture pearls" are obtained. The value of the fishing produce is between £25,000,000 and £30,000,000.

Manufactures.—The principal industries are the manufacture of cotton, silk, and woollen goods, paper, earthenware and glass, and matches. Japan is noted for cheap cotton and silk goods, as well as cheap toys, matches, etc., but the quality is, broadly speaking, below that of other countries. The industrial revolution in Japan occurred mainly after the China-Japan War of 1894-5. The growth of factories has been extremely rapid, especially during the Great War, but now Japan is finding it more difficult to maintain her export trade. Competition is particularly keen in Eastern markets, such as India. Japan is now concentrating her attention on the improvement of the quality of her goods. Just like Great Britain, Japan has to import much of the raw material for her industries—especially cotton (from U.S.A. and India), wool (from Australia), and iron.

The value of the produce of the principal Japanese industries is as follows (10 yen = £1).

	1923	1929
	£ millions	£
Cotton piece goods	57.0	} 145.9 millions
Silk piece goods	4.5	
Japanese paper	5.0	—
European paper	10.4	—
Matches	1.5	—
Earthenware	6.5	7.5
Lacquered ware	2.8	3.4
Matting	3.0	2.2
Leather	2.4	2.4
Oil	3.4	4.4
Knittings	4.7	11.8

Population.--The Japanese are the most progressive and probably the cleverest of all the Mongolian races. They have adopted and often improved all the great inventions of western nations. They have become a first-class power, with the third largest navy in the world, and all the men who are physically fit are trained either in the army or navy. One of the remarkable features of Japanese progress in the last 50 years has been the expansion in population from under 36,000,000 in 1879 to over 64,000,000 in 1930.

The indented character of the coast-line has had the same effect as in England. The Japanese are a seafaring people, and have a large merchant navy. The westernization of Japan has had the effect of causing a curious contrast between the many large industrial cities, quite like the manufacturing towns of Europe or America, and the quaint old country towns and villages.

Cities.--*Tokyo*, the capital, is one of the world's greatest cities, with 5 million people. It was partly destroyed by the earthquake in 1923. It is a busy manufacturing centre.

Osaka is the principal manufacturing city of Japan (the "Manchester" of Japan), and is also a port. *Kobe* is the second port of Japan. *Kobe* is close to *Osaka*, and the whole forms one great manufacturing district. *Kyoto* is the old capital of Japan, and a fine historic city. It has, however, moved with the times and developed numerous manufactures. *Yokohama* is the largest port of Japan; it is not only the port of Tokyo, but has large manufactures of its own. It was entirely destroyed by the earthquake and fire of 1923, and most of the merchants moved to *Kobe* or *Osaka*. They are gradually returning and the city is commencing to be restored. *Nagoya* is another modern centre. *Nagasaki* is a coal port and an important naval station, and the principal town on *Kiushiu*. *Hiroshima* is a large port on the Inland Sea, whilst *Moji* and *Shimonoseki* are twin ports at the western entrance to the Inland Sea. They are to be connected by a railway tunnel under the straits. It is from here that boats go across to Korea. *Hakodate* is the principal town and port of *Hokkaido*.

Railways.--Japan is well served by railways on the gauge of 3 feet 6 inches. One of the most important lines runs through the country and connects the principal towns—from *Shimonoseki* to *Hiroshima*, *Kobe*, *Osaka*, *Kyoto*, *Nagoya*, *Yokohama*, and *Tokyo*. The direction of many of the railways is controlled by the mountainous nature of the country.

Foreign Trade.--Care should be taken to distinguish between foreign and inter-imperial trade. Broadly speaking, it may be said that the Japanese Empire can be divided into two zones; an inner, densely populated industrialized inner zone, and an outer zone, the function of which is largely to supply food and raw materials to the

inner zone. Formosa, Chosen, Hokkaido, and Karafuto all belong to the outer zone; Old Japan (Honshu, Shikoku and

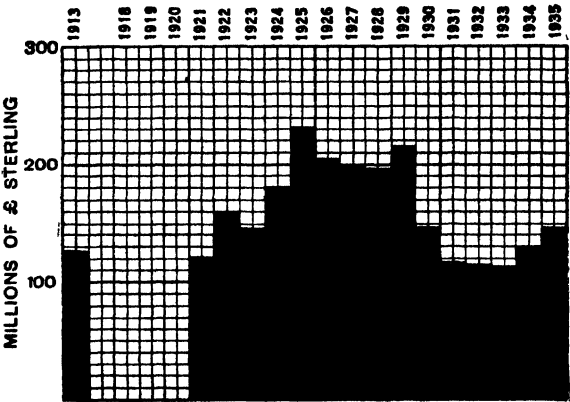


FIG. 478.—The exports of Japan.

(NOTE.—Expressed in yen the exports show a continuous rise from 1931 to 1934.)

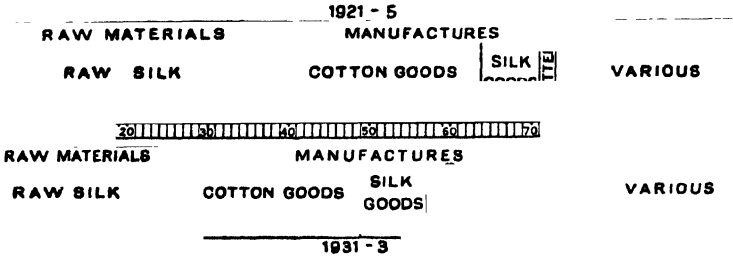


FIG. 479.—The exports of Japan.

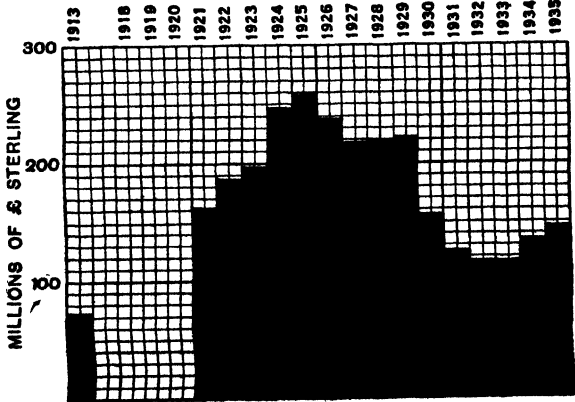


FIG. 480.—The imports of Japan.

(NOTE.—Expressed in yen the exports show a continuous rise from 1931 to 1934.)

Kiushu) form the inner ring. Figs. 478 to 482 explain Japanese foreign trade.

THE REGIONS OF JAPAN

The complex physical features of Japan make it difficult to distinguish natural regions as we have done elsewhere in this book and it will be simpler to describe the principal islands.

Kiushu.—Kiushu is the southernmost island of the three which constitute Old Japan and second in size to the mainland. It is roughly the same size as Formosa (14,000 square miles). It consists of a confused mass of mountains mostly volcanic in origin and some still active. The famous Aso-san lies in Kiushu. The coastline is very irregular and there are innumerable gulfs and bays of remarkable beauty. The coincidence of the rainy and hot seasons, with temperatures ranging up to 80°, has resulted in the weathering of

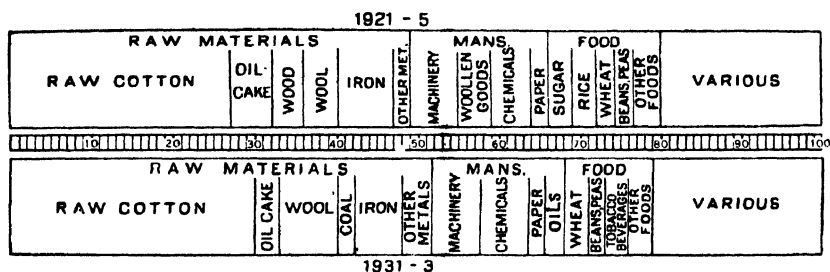


FIG. 481.—The imports of Japan.

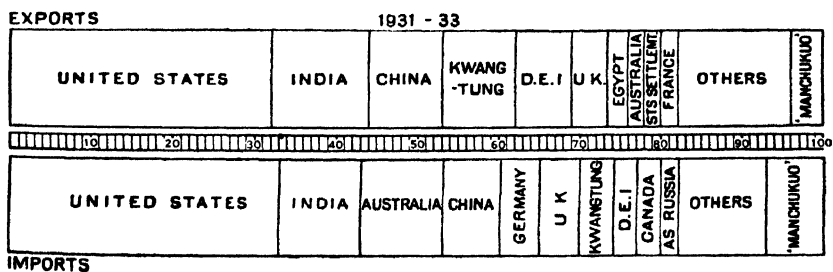


FIG. 482.—The direction of Japanese foreign trade.

many of the volcanic rocks into a deep rich soil. Everywhere there are small rich valleys and well-cultivated terraced mountain slopes, separated by the characteristic barren moorland of the Japanese islands overlying volcanic ashes. The island enjoys a very mild climate and produces in abundance subtropical crops and fruits. The important coal field near Nagasaki has already been mentioned; Kiushu has also valuable kaolin deposits which have given rise to a great ceramic industry (including the well-known Arita- and Satsuma-ware).

Shikoku.—The island of Shikoku is smaller than Kiushu, but, like it, has a very mountainous surface. The climate is even

milder; subtropical evergreen forests with camphor trees, camellias, and laurel-leaved oaks occur at the lower levels, whilst the hillsides are clothed with deciduous forests of horse-chestnut, beech, ash, oak, and magnolia. This is the part of Japan where two crops of rice are obtained. Shikoku has copper mines.

Hondo or the Mainland.—Reference has already been made to the physical features of Hondo. Very broadly, the island falls just into two portions; the “more anciently settled and highly developed south and east, and the wilder, less productive, north and west.” Between the two lies the main mountain backbone. Then there is a broad division into western and southern Japan, with its palms and bamboos, and northern Japan, the region of cold winters. Thus four regions can be separated, meeting in the central knot of mountains. There are only two alluvial plains of any size—those of Tokyo and Osaka. In western Japan the east-west backbone is a single one; barren, rocky spurs thrown off on the north and on the south separate the narrow cultivated valleys which only embrace about 5 per cent. of the total area. In northern Japan the mountains run in an approximately north-and-south direction.

Hokkaido or Yezo.—Hokkaido is roughly the same size as Scotland. A bleak, mountainous island under snow and ice for four or five months of the year, with its rivers radiating from a central mountain mass, it has for long defied efforts at close settlement and remains relatively thinly populated. The prosperity of the port of Hakodate is largely due to the near-by coal field. Elsewhere also the Japanese settlers are concentrated around the coasts. The old-established fisheries are still very important.

KOREA, OR CHOSEN

is a large mountainous peninsula. After the war between China and Japan in 1894, it became independent. In 1910 it was annexed to the Japanese Empire, partly in order that it might not be seized by Russia. The inhabitants, Koreans, number 21,100,000 (1930) and since 1919 have enjoyed political equality with the Japanese. Korea is essentially an agricultural country and grows more rice, barley, peas, beans, and cotton than are needed for home consumption and so is of the utmost importance to Japan. Korea also produces huge quantities of raw silk to feed Japanese industries. Korea is rich in minerals, including iron ore, which are so badly needed by Japan. The country is still largely undeveloped, but tremendous strides have been made since 1919. The great need is improvement of communications. The principal town is *Seoul*; whilst the port of *Fusan* is only about 120 miles from Shimonoseki, in Japan. Over 90 per cent. of the exports go to Japan, which supplies three-quarters of the imports. The leading export is rice.

TAIWAN

became part of the Japanese Empire after the China-Japan War in 1895. It is being carefully developed by Japan ; mining and agriculture are steadily progressing. Taiwan is the tropical possession of Japan and hence is able to provide a supply of raw materials and foodstuffs which cannot be produced elsewhere in the Empire. Of these sugar, maize, jute, and camphor are the chief. Rice and tea are produced and exported. Mining is also making steady progress and the production of coal now exceeds $1\frac{1}{2}$ million tons. The island has an area of 14,000 square miles and a population of 4,600,000, including 220,000 Japanese settlers.

KARAFUTO, OR JAPANESE SAKHALIN

consists of that portion of Sakhalin lying south of 50° N. There are large areas fit for agricultural and pastoral development, as well as a vast forest area of larch and fir. The very severe winters tend to deter settlement, but Karafuto is capable of becoming an important asset to the empire, especially as the island has considerable mineral wealth, including coal and gold. The petroleum of Sakhalin is mainly in the northern or Russian portion.

KWANTUNG

is the southern part of Liaotung Peninsula which has been leased from China. Its importance is mainly from its strategic position. Dairen has a fine harbour, and both Port Arthur and Dairen are connected by the South Manchurian Railway with Mukden, Harbin, and the Trans-Siberian. Kwanking has now been made virtually part of Manchukuo.

SIBERIA AND RUSSIAN TURKISTAN

Very roughly Siberia covers the same area as the lowland triangle of north-western Asia, drained mainly by the Ob, Yenesei, and Lena Rivers, which flow into the Arctic Ocean. The mouths of these rivers are frozen for a great part of the year, even during the time that their middle courses farther south are not frozen. As a result, the water cannot get out at the mouths and spreads over large areas, forming an enormous marsh. In the north is the *Tundra*, a frozen waste for part of the year, and a great marsh for the other. South of the useless Tundra lies the belt of Coniferous Forests—the Taiga, which in places is very marshy. To the east the forest belt stretches to the foot of the mountains of Mongolia, but to the south-west the forest passes gradually into grass land. The belt of grass land with scattered trees is the most fertile part of Siberia. The soil is rich like the “black earth” of Russia, and large quantities of wheat are grown. Farther south the land gets

drier and passes into steppe—poor grass land—and gradually into desert. Six natural regions can thus be separated : (1) The Tundra (2) The Taiga, or Coniferous Forest Belt. (3) The Fertile Savana land. (4) The Steppe. (5) The Desert. (6) The Mountainous Border.

The Savana, or Rich Steppe with trees, has most of the people of Siberia, and is the most developed region ; as well as wheat cultivation, large numbers of cattle are reared, and the manufacture of butter is important, especially in the rich valleys near *Kurgan*, *Omsk*, and *Barnaul*.

The Steppe is still undeveloped, and is inhabited by wandering tribes with herds of horses, camels, cattle, and sheep. There are important mineral resources not yet developed. In the desert area a narrow strip along the foot of the Persian mountains has been irrigated by means of short streams from the mountains and much cotton is grown. The mineral resources of the mountainous tracts are as yet scarcely touched.

Running from east to west right across Siberia is the Trans-Siberian Railway, its course lying to the south of the coniferous forests and the marshes, and in the fertile belt around Omsk and Tomsk.

AFGHANISTAN, IRAN, AND TURKEY

The countries which occupy the western extension of the Asiatic mountain system are, from east to west, Afghanistan, Iran, and Turkey. To the north of this area of mountains are lowlands, viz. the deserts of south-western Siberia, the Caspian Sea and surrounding lowlands, and the Black Sea. To the south are lowlands or seas—the Indus Valley, Persian Gulf, Mesopotamia or the Tigris-Euphrates basin, and part of the Mediterranean Sea.

TURKEY

Asia Minor is the only part now remaining of the once huge Turkish Empire in Asia. Turkey also possesses the territory in Europe round the old capital of Constantinople. Asia Minor extends from the Ægean Sea on the west to the Armenian Knot in the east, and can be divided into two parts.

The Plateau is dry and largely covered with poor grass. The principal occupation of the nomadic inhabitants is keeping herds of goats and sheep, especially the famous Angora goat (see under Mohair, Part I). In the heart of the plateau lies *Angora* (Ankara), now the capital of Turkey.

The Coastlands border the Mediterranean Sea and the Ægean Sea. The soil is often fertile and the climate is Mediterranean, so

that fruits such as the grape, olive, and fig are grown. Wheat, barley, tobacco and a little cotton are also produced. The principal port of Asia Minor is *Izmir*, formerly *Smyrna*, which commands easy valley routes on to the plateau.

IRAN (PERSIA)

Iran is a large country, but has only about fourteen people to the square mile, since a very great part is covered by deserts and high mountain ranges.

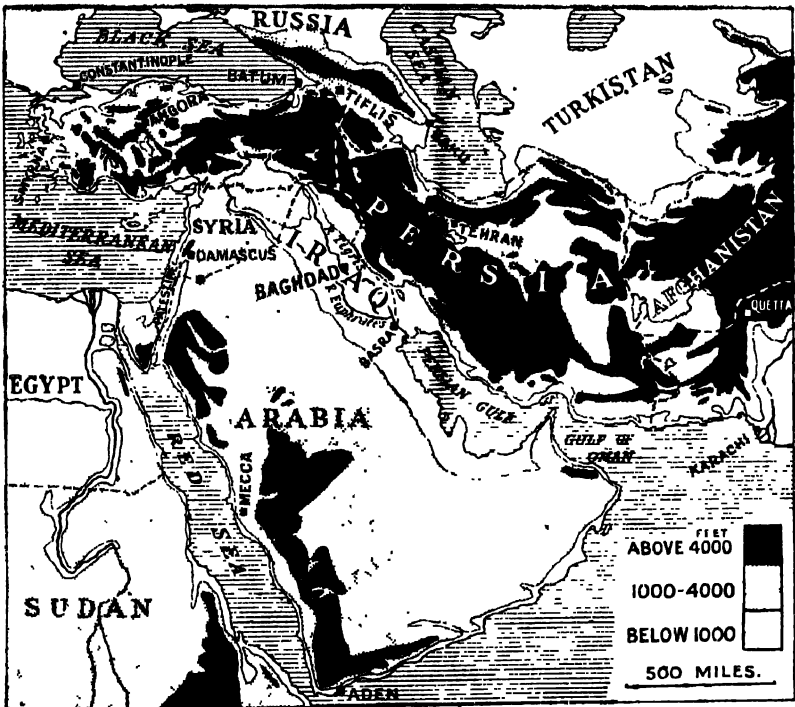


FIG. 483.—South-Western Asia.

The Northern Lowland Strip lies along the shores of the Caspian Sea; the rainfall is heavier than in other parts of Persia, and the soil is good. Rice, sugar, and cotton can be grown, but the strip along the coast itself is feverish. The slopes of the hills are forested, and the towns are built at the foot of the slopes. Above the forest, pasture land is found.

The Central Plateau and Mountains occupy most of the country. Surrounded by a ring of mountains is a great salt desert, and any rain drains into an inland lake. The winters are cold and the summers are hot; the little rain which does fall comes in the

winter, so that Persia really has a very dry type of Mediterranean climate. Most of the inhabitants live in oases in the desert where grain, cotton, tobacco, and opium can be grown, or in the more fertile valleys amongst the mountains. The mountains are inhabited by nomadic pastoralists. The most fertile valleys, where grain can be grown, are in the north-west, where the capital, *Tehran*, is situated.

The Gulf Coast bordering the plains of Mesopotamia, Persian Gulf, and Gulf of Oman, is a dry dusty region. It has recently become important owing to the development of oil fields. The towns along this coast, *Bushire* and *Bandar Abbas*, serve as ports for the interior

AFGHANISTAN

Most of Afghanistan is over 4,000 feet high, and many of the mountain ranges rise to 15,000 feet and more. The climate is continental, many areas are snow-covered for several months of the year, but the summers are hot and dry. The Afghan people are mainly nomads, and their wealth lies in their flocks of sheep, goats, etc. Agriculture, where practicable, is carried on by the help of irrigation.

ARABIA AND THE LOWLANDS OF SOUTH-EASTERN ASIA

The former Turkish dominions in Asia, south of the mountain belt, are now divided between Syria (under French mandate); Palestine and Transjordan (under British mandate); Iraq (an Arab kingdom under British protection), and the independent kingdoms of Arabia. Syria, Palestine, and Transjordan all contain a large proportion of fertile agricultural land; irrigation may restore much of the ancient importance of Mesopotamia.

EXERCISES

1. The Mineral Production of India. Keep the table up to date from the *Statesman's Year Book*.
2. Agriculture in India. Keep the table and other figures up to date from the *Statesman's Year Book*.
3. Population of India. Keep the table up to date from the *Statesman's Year Book*.
4. The Foreign Trade of India. Figs. 440 to 444 should be kept up to date from the *Annual Report of the Balance of Trade* (League of Nations). In the *Statesman's Year Book* and other publications the figures given are *not* for calendar years. (Note 1 rupee = 1s. 6d.)
5. The Foreign Trade of Ceylon, Malaya, and China. Keep up to date from the *Statesman's Year Book*.
6. The Production of Japan. Keep up to date from the *Statesman's Year Book*.
7. The Foreign Trade of Japan. Keep up to date from the *Annual Report on the Balance of Trade* or the *Statesman's Year Book*.

EXAMINATION QUESTIONS

1. Write a concise geographical account of either Ceylon or Tasmania. (*Univ. London Inter. B. Com.*, 1925.)
2. Divi de the Yangtze Basin into natural regions, with a short account of each region. (*Univ. London Inter. B. Com.*, 1925.)
3. Give a reasoned account of the distribution of rainfall in India, both as regards time of fall and total precipitation in the different regions. (*Univ. London Inter. B. Com.*, 1926.)
4. Give a brief account of the foreign trade of India. (*Univ. London Inter. B. Com.*, 1927.)
5. Point out what, in your estimation, geographical factors have contributed to the tardy economic development of China. Do you consider that Japan is or is not better endowed in this respect? (*Univ. London Inter. B.Sc. (Econ.)*, 1926.)
6. Relate the distribution of population to agricultural development in India. (*Univ. London Inter. B.Sc. (Econ.)*, 1927.)
7. Compare the relative merits of Calcutta and Delhi as capitals of India. (*Univ. Sheffield Inter. Hons.*, 1925.)
8. Write a geographical account of the position and development of Singapore, Hankow, Tientsin, Yokohama. (*Univ. Oxford Dipl.*, 1926.)
9. Compare the principal rivers of China as avenues of intercourse between the ports and the inland districts. (*Univ. Bristol Inter.*, 1926.)
10. Give an account of the Baghdad Railway from topographical, economic and political standpoints. (*Univ. Bristol Inter.*, 1925.)
11. Examine critically the view that China is overcrowded. (*Univ. Oxford Dipl.*, 1926.)
12. Estimate the economic prospects and possibilities of Chinese settlement in Manchuria. (*Univ. Oxford Dipl.*, 1926.)
13. Give an explanatory account of the distribution of population in India with special reference to areas of high density. (*Univ. Bristol Inter.*, 1926.)
14. Draw a sketch-map showing the division of either India or Australia into its principal vegetational regions; and give a reasoned account of one of these regions. (*Univ. Leeds 1st Year*, 1927.)
15. Draw a sketch-map showing the principal structural divisions of either India or Australia. Give an account of the physical geography of one of the major structural divisions you indicate. (*Univ. Leeds Inter.*, 1926.)
16. Give a reasoned account of the economic geography of Mesopotamia, with reference to probable and possible developments. (*Univ. London B.A. Hons. Econ. Geog.*, 1927.)
17. Examine the possibilities of developing a large-scale iron and steel industry in India. (*Univ. London B.A. Hons. Econ. Geog.*, 1927.)
18. Analyse with reference to geographical conditions the external trade of India. (*Univ. London Higher Schools E.*, 1932.)
19. Suggest a division of the Japanese Empire into geographical regions, and give a short account of each region. (*Univ. London Higher Schools E.*, 1932.)
20. Take any two of the areas—the Deccan, Manchuria and the Si-kiang Basin—and show how they differ geographically from each other. (*Univ. London Higher Schools E.*, 1932.)
21. Give an account of the production of cotton and the cotton manufacturing industry in India or China or Japan. (*Univ. London Inter. B.Sc. (Econ.)*, 1932.)
22. Describe briefly the distribution of mineral resources and the exploitation of these resources in India or China or Japan. (*Univ. London Inter. B.Sc. (Econ.)*, 1932.)
23. Give an account of the geographical factors which have led to the remarkable density of population found in monsoon lands (India, China, and Japan). (*Univ. London Higher Schools E.*, 1932.)

CHAPTER XX

EUROPE

GENERAL CONSIDERATIONS

Position and Size.—With an area of only 3,760,000 square miles, Europe is the smallest of the continents excepting Australia. It is characterized by the comparatively great length of the coastline, broken up everywhere by peninsulas, gulfs, bays, and fringed by islands, with the result that only the heart of Russia is more than

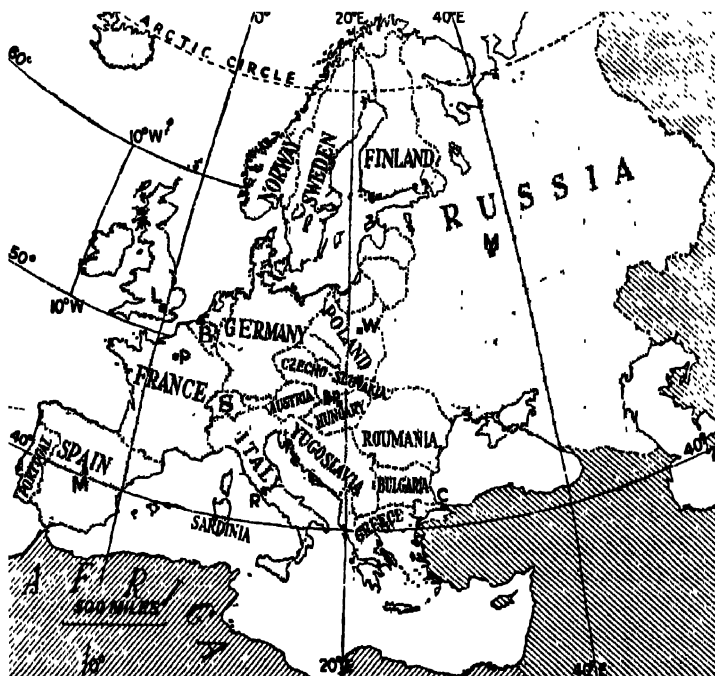


FIG. 484.—The position and size of Europe.

500 miles from the sea. Europe lies almost entirely in the North Temperate Zone; only a small fragment in the north is within the Arctic Circle ($66\frac{1}{2}^{\circ}$ N.). It is useful to note the position of latitude 40° N.; cutting Spain and Portugal nearly in half; cutting off the "toe" of Italy, passing through Greece and running south of the Black Sea, but across the south of the Caspian. Note also that the British Isles lie roughly between latitudes 50° and 60° .

The central meridian in Europe is 20° E. (the same one as we used in the case of Africa); the all-important meridian of 0° passes, of course, through London; through the heart of Russia runs 40° E.

Physical Features.—Europe may be considered as consisting of three sets of units :

(a) The mountain masses of the north, consisting mainly of ancient metamorphic rocks.

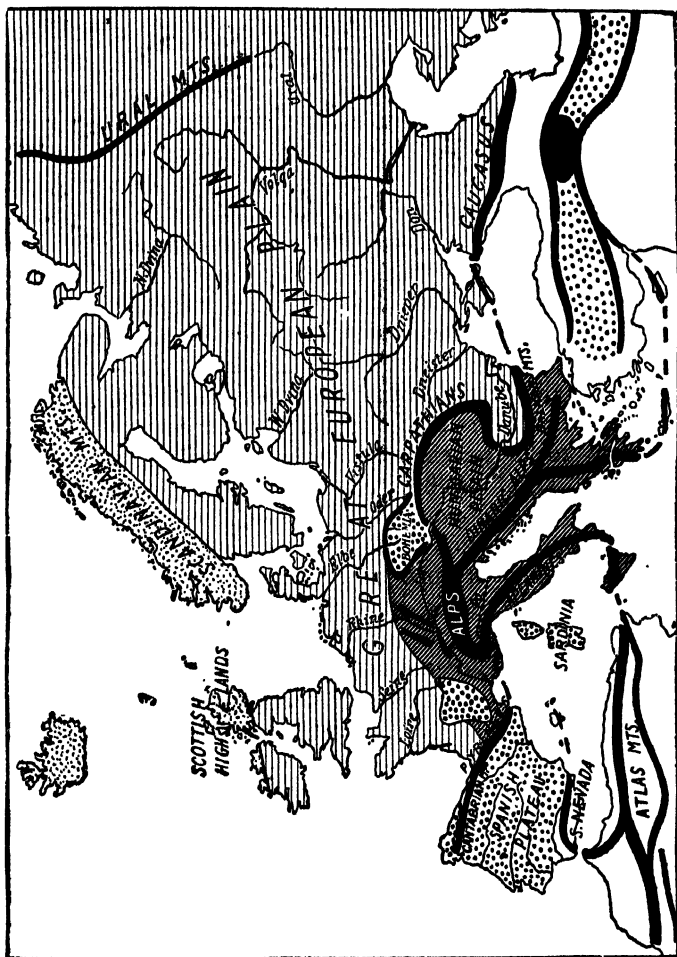


FIG. 485.—The main physical features of Europe.

(b) The great European Plain, formed partly of young rocks and partly of older rocks which have been much worn down in the course of long ages.

(c) The great series of Young Fold Mountains in the south, formed of many mountain loops, enclosing small plains and plateaus.

The Mountain Masses of the North.—There are now four masses, each consisting of old, hard, crystalline rocks. Probably the four masses were once joined up forming a single piece of land. The largest mass is the Scandinavian Mountains; the second mass forms the Highlands of Scotland; the third mass the north of Ireland; the fourth mass constitutes the island of Iceland, but there the old rocks have been covered up by lavas poured out of volcanoes.

The Great European Plain.—Much of the great plain which covers Northern Europe is less than 500 feet above sea-level, and nearly the whole of it is under 2,000 feet. It must not, however, be looked upon as a flat plain like the Amazon lowlands, or even a gently undulating area such as the Prairie regions of America, being broken up by a multitude of small hills and even by minor mountain ranges. The whole is of very varied character as far as its geological structure is concerned. To the east the Great European Plain fades into the great plain lands which occupy the whole of Russia and the Baltic States. On this tract there is an underlying foundation of ancient metamorphic rocks, broadly comparable with the Canadian Shield in character, but covered over the greater part of its extent by series of sedimentary rocks. In the north (Finland, etc.) the old rocks appear at the surface; over most of the area the overlying sedimentary rocks remain practically horizontal, as the great "Russian platform" has been resistant to folding movements.

The Young Fold Mountains.—The complicated series of young fold mountains, mostly of Tertiary or "Alpine" age, which occupy the southern half of Europe may be understood most simply by taking the great mountain knot of the Alps as a starting-point. The Alps themselves form a short curve from west-south-west to east-north-east. The western end of the chain swings southwards, then eastwards, and then runs south-eastwards through Italy as the Apennines, curving westwards again through the toe of Italy, into Sicily. From Sicily to North Africa there is only a small gap, and the same line forms the important Atlas Mountains of Africa. The Atlas Mountains consist of two or more parallel ranges. A branch curves away northwards and runs into Spain as the Sierra Nevada. See Fig. 485.

From the western end of the Alps another branch runs south-westwards, but it is soon cut off by the sea, to be continued later as the Pyrenees and the Cantabrian Mountains.

From the eastern end of the Alps there are really three main branches. One runs south-eastwards as the Dinaric Mountains into the Balkan Peninsula, where it divides. A second runs eastwards and is cut across by the Danube, only to be continued in a long curve like an "S" written backwards, forming the Carpathians, Transylvanian Alps, and the Balkan Mountains. The third branch

forms a small loop to the north, surrounding the plateau of Bohemia. Close to the Alps on the north-west lies a small range, the Jura, parallel to the main ranges of the Alps. The Jura continues northwards as the Black Forest and Vosges. Enclosed, or partly enclosed, by these fold mountains are plateaus and plains. Many of the plateaus consist of old rocks which have formed resistant massifs. Nearly the whole of Spain is occupied by a high plateau called the Meseta. In the south of France, to the west of the Alps, lies the Central Plateau. North of the Alps, a series of small plateaus builds up Southern Germany; the distinctive Bohemian Plateau we have already noted. It may be mentioned here that the Mediterranean Sea has been largely explained by the "foundering" of large blocks of the earth's surface; the islands of Corsica and Sardinia may be looked upon as remnants of these masses.

The most important plains enclosed by the mountain chains are the Valley of the Po or the Plain of Lombardy in Northern Italy and the Great Hungarian Plain.

The Rivers of Europe.—Europe has many rivers; most of them are small, but they are important because they are of great use to the busy industrial countries through which they flow. We may separate the larger rivers into three groups:

- (a) Rivers flowing northwards from the fold ranges to the sea on the north side of the mountains.
- (b) Rivers on the south side of the mountains.
- (c) The rivers of Russia.

Rivers flowing Northwards.—In France are the Loire and the Seine; in Germany, the Rhine, Elbe, Oder; and in Poland, the Vistula.

Rivers to the South of the Mountains.—This group includes the rivers of Spain and Portugal—The Douro, Tagus, Guadiana, and Guadalquivir emptying into the Atlantic Ocean, and the Ebro into the Mediterranean. In France is the Rhone, and in Italy the Po. One of the most important rivers of Europe is the Danube, which rises to the north of the Alps but which flows east-south-eastwards, cutting through three important ranges before it reaches the Black Sea.

The Rivers of Russia.—The longest river in Europe is the Volga, which does not enter into the ocean but flows into the largest salt lake in the world—the Caspian Sea. The greater part of Russia lies in the basin of the Volga. In South Russia are the Dnieper and the Don, flowing into the Black Sea; in North Russia, the Western Dwina and the Northern Dwina.

The small but important rivers of the British Isles will be separately considered.

Geology.—The geology of Europe is too complicated to describe

here, and it will be dealt with where necessary under the individual countries. We may, however, remember that the mountain masses of the north consist of old, hard, crystalline rocks, and so do some of the smaller plateaus of the south; whilst most of the existing mountain ranges are of much later date.

The geography of Northern Europe—like that of North America

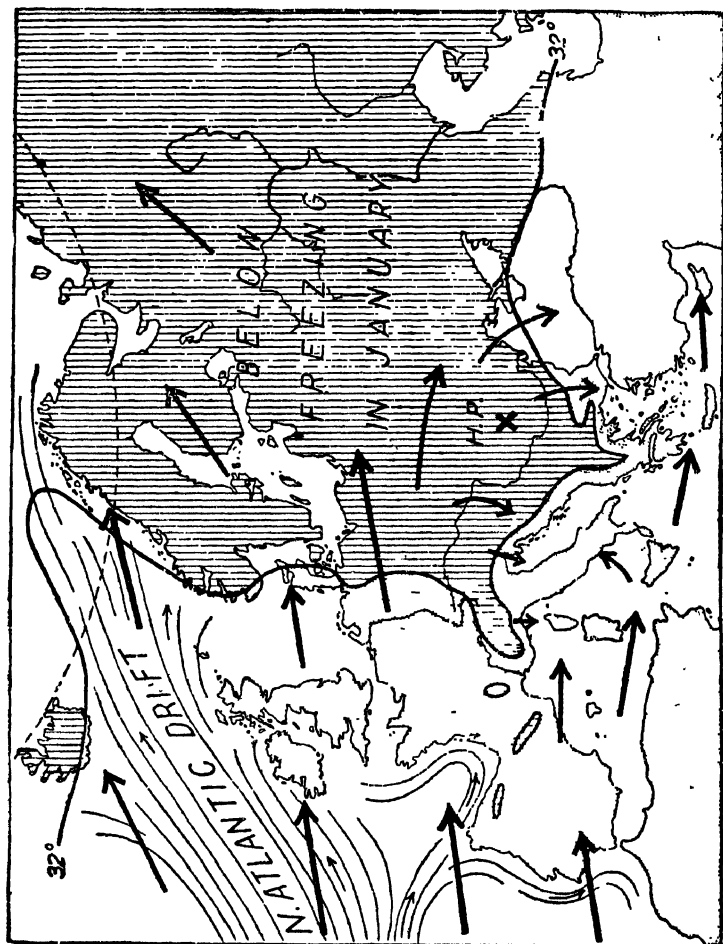


Fig. 486.—Climatic conditions—cold season. Average surface temperatures are shown, *not* sea-level isotherms.

—has been profoundly affected by the ice-cap which covered it during the Glacial Period. A smaller ice-cap with radiating glaciers, covered the Alps. Northern Russia, Finland, and Sweden are comparable with the Laurentian Shield in exhibiting enormous numbers of lakes occupying hollows scooped out by ice. Most of the north European Plain is covered with a thick mantle of glacial deposits—the so-called “diluvial” deposits of the older geologists.

This word "diluvial," which indicates the long-deceased belief that these deposits were formed during Noah's flood, unfortunately still persists in some geography books. The glacial deposits vary in character from heavy boulder clay, which often gives rise to waterlogged marshy tracts, to coarse sands, causing sterile heathlands. The struggle of Danish, North German and Polish agriculturists

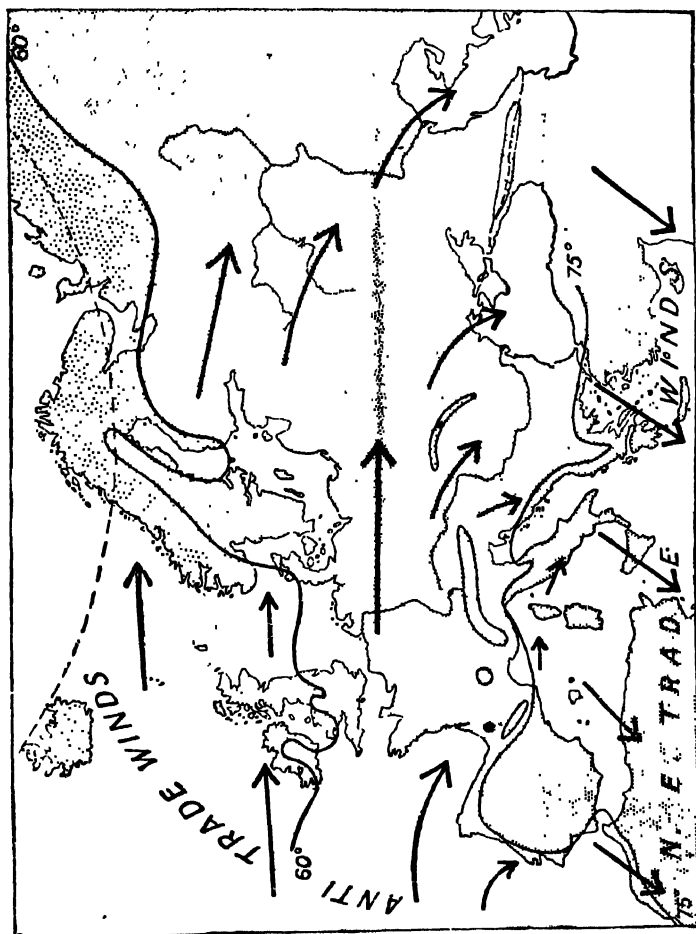


FIG. 487.—Climatic conditions—hot season. Average surface temperatures.

against unfavourable soil conditions is a factor of great geographical importance.

Climate.—*Winter Conditions.*—Owing to the southward swing of the wind systems, in the winter months the whole of Europe then lies in the belt of the westerly winds and Europe enjoys the warm, moisture-laden winds from the Atlantic Ocean. The western coasts of the continent are also bathed by a warm current—the North

Atlantic Drift—which is a continuation of the Gulf Stream. The western part of the continent is thus kept warm by both winds and currents. The eastern part of the continent, on the other hand, is a long way from the Atlantic Ocean with its warm winds and warm currents, but is very near the great land mass of Central Asia, which, in the winter season, gets very, very cold. So we find that in Europe

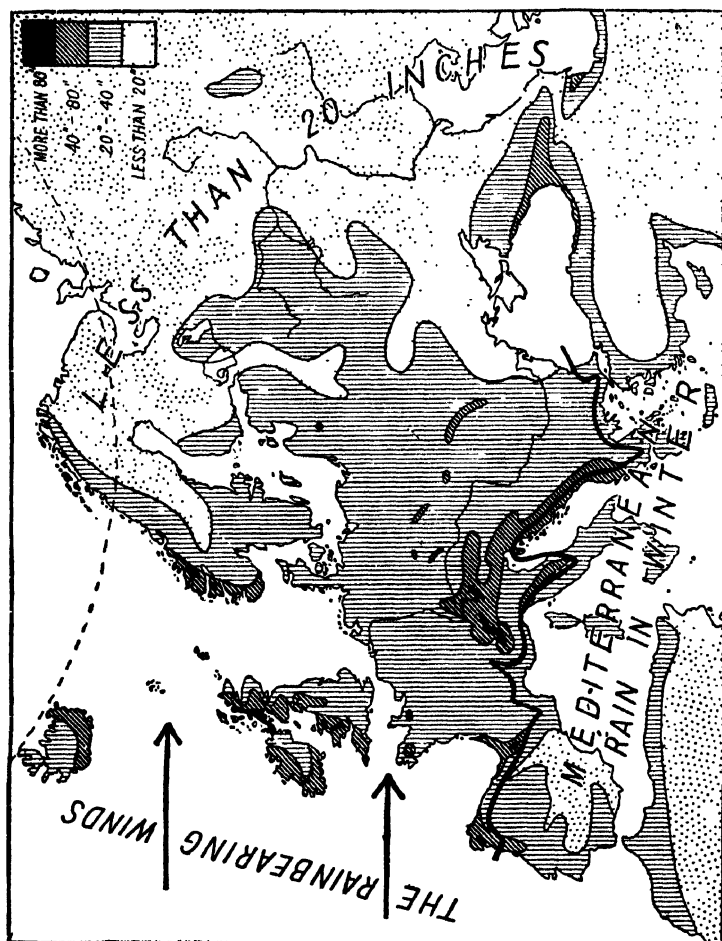


FIG. 488.—Rainfall map of Europe for the whole year.

The thick black line separates the winter rain region from the rain all the year region.

in the cold season it gets colder and colder as we travel from west to east. Notice that the rain-bearing winds come from the west, and, as we should expect, the west gets more rain than the east. Rain falls over nearly the whole of Europe at this season, but most falls where there are mountain ranges to intercept the winds. The rainfall map of Europe is thus a very complex one, owing to the numerous small mountain ranges.

Summer Conditions.—At this season the wind systems of the world have moved to the north, and so only the northern part of Europe is under the influence of the South-West Anti-Trade Winds. The southern part of Europe, namely the countries surrounding the Mediterranean Sea, forms part of the high-pressure belt which surrounds the globe just outside the Tropics. It is from this high-pressure belt that the North-East Trade Winds take their rise. In the summer, therefore, the Mediterranean lands do not receive cooling or rain-bearing winds from the Atlantic Ocean, but suffer from considerable extremes of heat and comparative or even complete rainlessness—the typical Mediterranean climate. As far as



FIG. 489.—Climatic regions of Europe (after Kendrew).

the remainder of Europe is concerned there is, broadly speaking, a steady drop in temperature as one travels northwards; but the continental mass of Russia is hotter than corresponding latitudes on the west coast. This is quite a different state of affairs from that which prevails during the winter months. In the spring there is a marked tendency for the formation of a low-pressure area in southern Russia into which rain-bearing winds are drawn (see Fig. 487) resulting in the light spring rain of the steppe lands. Generally the summer rainfall of North-Western Europe and Central Europe depends on the incidence of the succession of cyclones and anti-cyclones which characterize the westerly wind belt.

Climatic Regions.—A convenient division of Europe into

climatic regions is shown in Fig. 489. It will be noticed that the region of North-East Europe corresponds to that having a "Cold Temperate Climate" (see Chapter IV); South-East Europe or Southern Russia has a Temperate Continental Climate (Chapter IV); whilst the area having a Cool Temperate Oceanic Climate has been

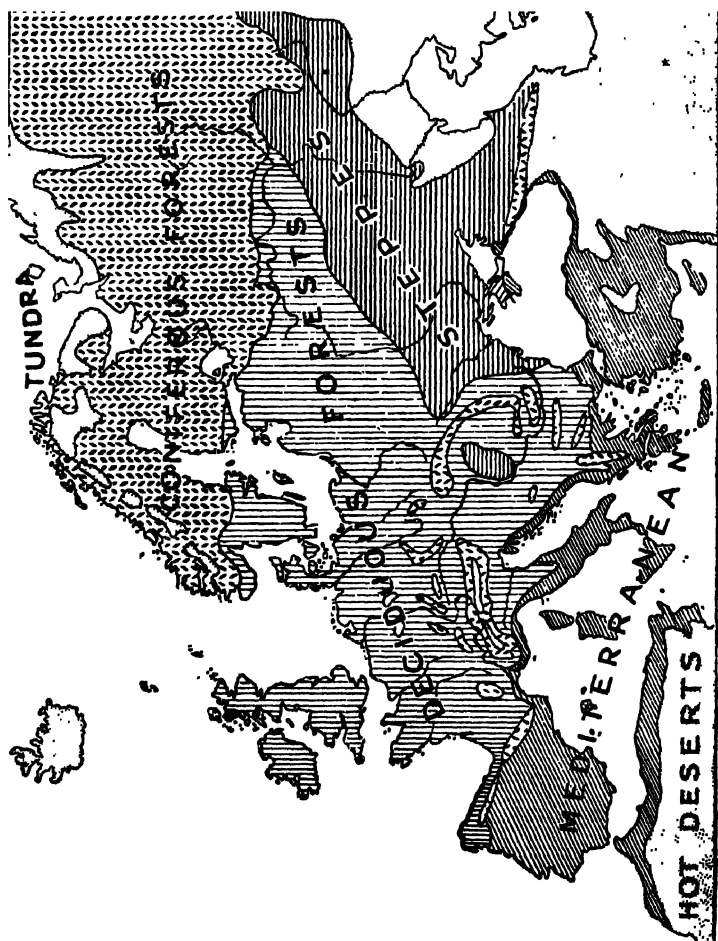


FIG. 490.—The natural vegetation of Europe.

separated into the three sub-types of North-West Europe, Central Europe, and Central Russia.

Vegetation.—Many of the countries of Europe are very thickly populated, and the natural vegetation has been removed by man over large areas—notably in the British Isles, France, and Germany. This must be borne in mind when studying Fig. 490.

Population.—Except in the extreme north or in parts of Russia and the south-east, Europe is inhabited entirely by peoples of the

White or Indo-European race. There are three main divisions. The people of the north, the Nordics, are tall, pale coloured, and usually with light hair and eyes. The people of the south, the Mediterranean peoples, are darker skinned, shorter in stature, and have dark hair and eyes. Between these two, in Russia and Central Europe, we find the Alpine peoples, with broad, flat faces and heads which are short when measured from back to front. It is, of course, a well-known fact that the population of Europe is densest in the great industrial regions.

In the south-east of Europe, on the steppes and the grass lands of Hungary, there are Mongolian peoples (the Magyars of Hungary and the Cossacks of Russia).

The Countries of Europe.—Many of the great civilizations of the ancient world arose round the Mediterranean Sea, and in turn the Mediterranean countries have been centres of vast Empires—Greece, Rome, Spain and Portugal. But the climate of the Mediterranean is too kind; perhaps it is responsible for habits which in time undermine even the greatest Empires. The centres of the great empires and great civilizations have moved to the countries of Northern Europe with their more vigorous climate—Great Britain, France, Holland, Belgium, and Germany.

The countries of Europe may be grouped according to their geographical position :

Countries of the North-West.—British Isles, Norway, and Sweden.

Countries of the Great European Plain.—The Baltic States, Poland, Germany, Denmark, Holland, Belgium, and France.

Countries of the Mediterranean.—Spain and Portugal, Italy, Albania, and Greece.

Countries of Central Europe and the Danube Basin.—Switzerland, Austria, Czechoslovakia, Hungary, Yugoslavia, Rumania, and Bulgaria.

Eastern Europe.—Russia.

The United Kingdom, Norway, Denmark, Holland, Belgium, and Italy are empires with foreign possessions; Sweden, Hungary (no king at present), Yugoslavia, Albania, Greece, Rumania, and Bulgaria are kingdoms without foreign possessions; France, Spain, Portugal, and Russia are republics with foreign possessions; whilst the other countries mentioned above are republics without.

THE BRITISH ISLES¹

Position and Size.—The British Isles comprise the two large islands (Great Britain and Ireland) together with a number of small islands, lying off the north-west coast of the continent of Europe.

¹ In the space available it is possible to give but the broad outline of the geography, especially the economic geography, of the British Isles. Reference should be made to the author's "Regional Geography," Part V (Longmans).

The English Channel, narrowing eastwards to the Strait of Dover which is only twenty-one miles wide at the narrowest part, separates the south of England from France; the North Sea lies between Britain and Holland, Germany, Denmark, and Norway.

The island of Great Britain consists of the three countries, Scotland in the north, Wales in a part of the west, and England occupying the remainder. England, Scotland, and Wales have been joined under one king since 1603. Since 1920 Ireland has been divided into "Northern Ireland" and the "Irish Free State." Northern Ireland has a parliament of its own but is otherwise closely united with Great Britain, but the Irish Free State is an independent

dominion of the British Empire, having a president of its own. "United Kingdom" used to mean the United Kingdom of Great Britain and Ireland; now it means the United Kingdom of Great Britain and Northern Ireland. The distinction is important when comparing pre-War and post-War statistics, and care must always be taken when studying figures in official publications to see whether they apply to England and Wales only, or to Great Britain or to the United Kingdom. It



FIG. 491.—The world position of the British Isles—London the centre of the land hemisphere.

should be noted that the Channel Isles and the Isle of Man enjoy certain privileges in matters of government and are sometimes included, sometimes excluded, in statistical compilations. The following table is given for reference purposes:

	Area in square miles	Population in millions		Density	
		1921	1931	1921	19—
The British Isles . . .	121,000 ¹	47.15	—	—	
England	50,874	35.68	37.80	701	
Wales	7,466	2.21	2.16	295	
Scotland	30,405	4.88	4.84	161	
Isle of Man	221	0.06	0.05	273	
Channel Isles . . .	75	0.09	0.09	1,203	
Northern Ireland	5,237 ²	1.26 ²	1.25	240	
Irish Free State . .	26,592 ²	2.97 ²	—	112	

¹ Approx.

² Excluding inland waters.

³ 1926.

The British Isles lie mainly within the quadrilateral formed by two lines of longitude (0° and 10° West) and two lines of latitude (50° and 60° North). In the halcyon days of Greece and Rome, and indeed until the Middle Ages—so long as the Mediterranean remained the focus of the world's life and commerce—the British Isles lay on the fringe of the known world. The discovery of America and the rapid growth in importance of the lands on the western side of the Atlantic revolutionized the importance of Britain's geographical position. Britain lies in the centre of the land hemisphere, her climate kept genial and her ports always free from ice by the influence of the North Atlantic Drift, facing the most important and most developed part of America on the one hand and the embouchure of the most important rivers of Europe on the other. There is no doubt that the central geographical position of Britain in the modern world is an important factor in her prosperity.

Physical Features.

—The advantages accruing to the British Isles by virtue of their world position have been greatly enhanced

by the structure of the islands themselves. The seas surrounding the islands are shallow—and the extensive continental shelf affords breeding and feeding grounds for the fish which from earliest times have attracted Britons to the sea. The British Isles have a very long coastline, for the coasts are very deeply indented so that no part of the islands is as much as one hundred miles from the sea. The tide-scoured inlets afford excellent harbours and, further, there are no high mountains to hinder communication with the interior. Though many parts of the islands are hilly and even mountainous, the greatest elevation reached in England and Wales is under 4,000 feet whilst the highest peak in Scotland, Ben Nevis, attains but 4,400 feet.



FIG. 492.—The Continental Shelf round the British Isles.

The shallow seas (all parts shown in white are less than 600 feet deep) afford fine breeding and feeding grounds for fish and so give rise to the great fisheries.

The British Isles are divisible into a number of fairly well-defined physical units, as shown in Fig. 493. Scotland falls into three divisions :

The *Highlands* form a great dissected plateau occupying the northern half of Scotland, divided into two by the deep trench of Glen More, which separates the north-west highlands from

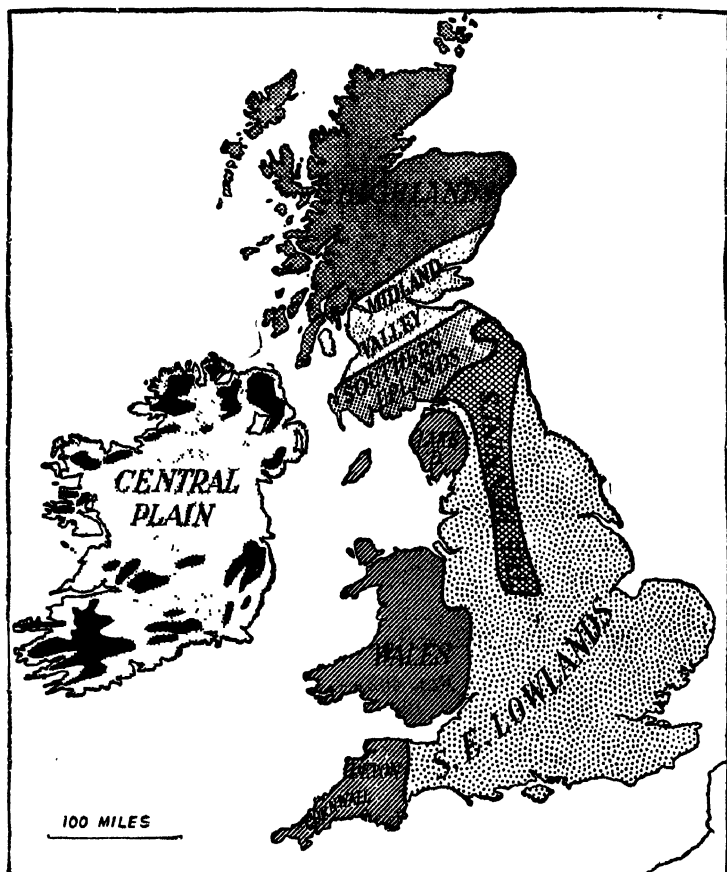


FIG. 493.—The main physical divisions of the British Isles.

the Grampians. The scenery of the plateau has been moulded to a large extent by ice action during the Great Ice Age. The west coast is a typical fiorded coast with wild rocky scenery. The fiords of Scotland, like those of Norway, are deep, steep-sided inlets of the sea, often marked by sharp, almost right-angled bends and by a submerged ridge near the mouth. They are generally believed to have been excavated by tongues of ice

working along lines of weakness caused by two sets of great cracks at right angles.

The Southern Uplands are formed by a broad low fold range running with a north-east to south-west trend (Caledonian trend) across the south.

The Midland Valley, the most important part of Scotland, lies between the Highlands and the Southern Uplands.

England and Wales may, in the first instance, be divided very simply as shown in Fig. 493.

If a line is drawn across England and Wales from south-west to north-east, it is found that the old rocks and the mountainous regions lie to the north-west, whilst to the south-east are mostly young rocks and lowlands. To the north-west there are three main areas of mountains—

The Lake District of the north (Cumbrian Mountains).

Wales, consisting of very old rocks in the north (Cambrian Mountains), but with a great coal basin in the south (South Wales Coalfield).

Devon and Cornwall, or Cornubia, occupying the peninsula of the south-west.

Then running down the centre of the north of England is its backbone, the Pennine Range. Part of the great Midland Plain wraps round the southern end of the Pennine Upland and separates it from the other hill masses.

The south-east of England consists of low ridges running from south-west to north-east, marking the outcrops of successive beds of rock. In the extreme south-east is an arch or anticline running from east to west (the Weald), whilst London lies in the syncline (London Basin).

Ireland is shaped like a saucer, a central lowland surrounded by a broken and irregular rim of mountains. The mountains in the north (Donegal Mountains) once joined the Highlands of Scotland; the mountains of the south-east (Wicklow Mountains) were once part of the Welsh mass.

Rivers.—The rivers of the British Isles are short, and since the mountains are usually on the western sides of the islands, most of the longest ones flow eastwards. The rivers are not as a rule swift enough to supply hydro-electric power (though some of the Scotch streams are sufficiently swift, and in Ireland the River Shannon is being harnessed at the present time); they are too shallow to be used by river steamers, but they are very important commercially, because their mouths are often navigable by the largest ocean-going vessels and afford excellent harbours. They are not subject to floods but have a gentle flow of water, and tides help to keep the mouths clear all the year round. They are rarely, if ever, frozen. Look

carefully at the map and note the position of these rivers, with the ports which lie near their mouths: Dee, Tay, Forth (east of Scotland), Tyne, Tees, Humber, Thames (east coast of England), Clyde (west of Scotland), Mersey and Severn (west of England). The only large river in Ireland is the Shannon. The fact that the majority of English and Scottish rivers flow eastwards is a fortunate circumstance from the economic point of view since their mouths face the great river outlets of the Continent. Though not mountainous, practically the whole surface of England is hilly, and the relative unimportance of water transport, despite an extensive canal system, when compared with France or Germany, is due mainly to the large number of locks necessary on the canals.

Geology and Minerals.—The physical features of the British Isles reflect the underlying structure in a remarkable way. Indeed, it is almost impossible to describe the physiography of the country without reference to the geology. It may, therefore, be useful to analyse the physical units already separated, with reference to their geology.

The Highlands of Scotland consist of an ancient massif, mainly of very ancient crystalline rocks, and forming one of the masses already mentioned as lying in the north of Europe. Masses of granite penetrate the old rocks and in some areas are quarried as building stone (as at Peterhead and Aberdeen). The ancient rocks afford but a poor soil; the Highlands are for the most part covered with moorland and the most fertile land is in the eastern valleys and coastal plain.

The Southern Uplands of Scotland are formed by a folded massif of rocks older than the coal measures. Again they yield but a poor soil, hence the prevalence of sheep pastures.

The Midland Valley is a great rift valley consisting of a block of sedimentary strata let down between the older rocks of the Highlands on the north and the Southern Uplands to the south. The faults which bound the valley run across the country in a north-east to south-west direction. The "Highland Boundary Fault" is especially well marked and the change of country is remarkable. On either side of the Midland Valley are the Old Red Sandstone rocks; in the centre the beds are mainly of Coal Measure Age and include several coal basins—the Clyde Basin in the west; Midlothian and Fifeshire in the east. Masses of old volcanic rocks give rise to hilly areas in the valley itself (Ochil Hills, Sidlaw Hills, etc.).

The Lake District is one of the ancient massifs of England and was probably once continuous with the Isle of Man. The old rocks in the centre of the Lake District are wrapped round on all sides by younger.

Wales is another ancient massif. The mountains of north and central Wales are formed by old rocks folded so that the grain of

the country is again "Caledonian" (N.E.-S.W.). In South Wales is an area of younger rocks folded into a great basin or syncline, and forming the South Wales Coalfield. The fold has an Armorican or east-westerly trend.

Devon and Cornwall are also built up of a massif of ancient rocks folded into east-westerly folds. The rocks have been penetrated by a number of great granite masses and it is with the marginal areas of these granites that the metalliferous zones are associated.

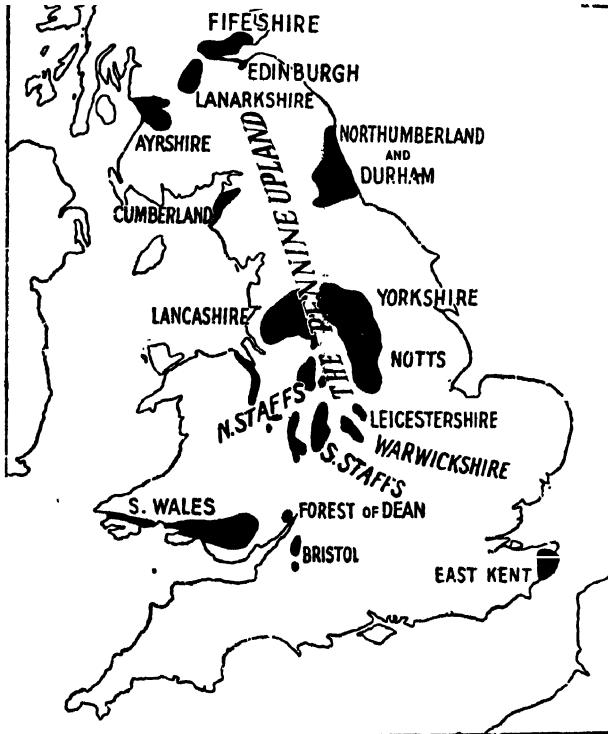


FIG. 494.—The coal fields of Great Britain.

The Pennines form the backbone of the north of England. Originally Carboniferous rocks, probably including Coal Measures with coal seams, they were deposited as continuous sheets right across the north of England. Subsequently they were folded by a great fold with a north-south trend so that the coal is now found on either side of a central ridge of older Carboniferous rocks. East-west folds also affected the area so that the coal seams actually occur in isolated basins arranged on either side of the Pennine Uplift thus :

Cumberland Coalfield
Lancashire Coalfield
North Staffs Coalfield
South Staffs Coalfield

Pennine
Uplift

Northumberland-Durham Coalfield
Yorkshire Coalfield
Nottinghamshire Coalfield
Leicestershire Coalfield

The *Midland Plain* is built up mainly of hardened red mudstones and red sandstones grouped by geologists in the Permian and Triassic systems, though formerly called the "New Red Standstone." These soft deposits, which weather to an excellent fertile red soil, wrap round the southern end of the Pennine Upland and partly cover the coal fields on its two flanks.

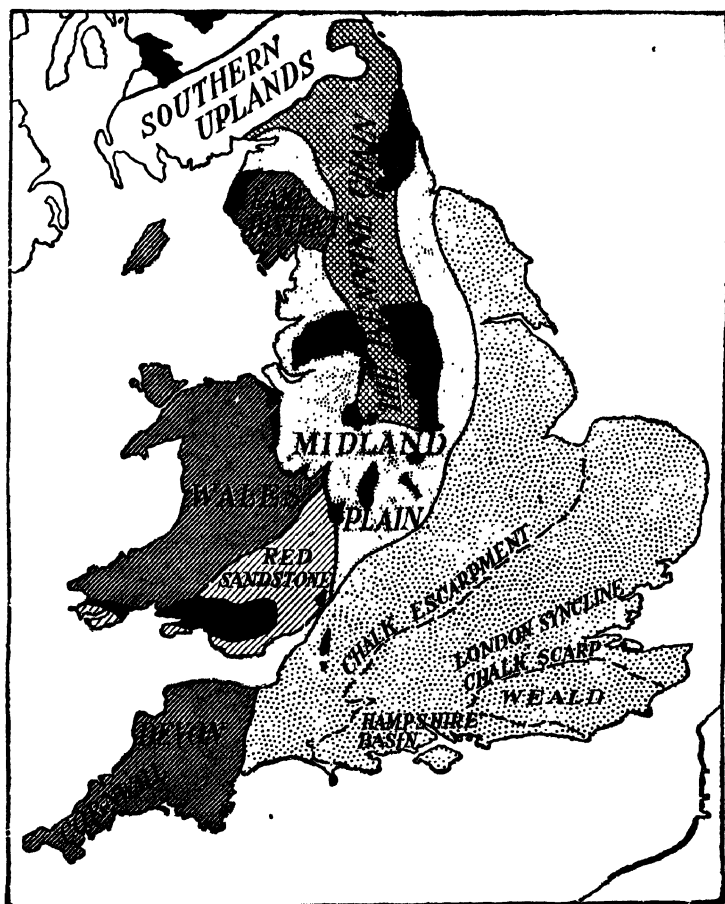


FIG. 495.—The natural regions of England and Wales.

(For Pennine Chain read Pennine Range.)

South-Eastern England is often referred to as the "Scarplands," because the alternating successions of clays, sands, and limestones of which it is built up have weathered into a series of "clay vales," and "limestone ridges." The latter have steep "scarp slopes" facing the clay vales and long gentle dip slopes. In the extreme south-east of England is a conspicuous and famous anticline, the Weald, the structure of which is shown in Fig. 497. To the north of

it lies the syncline of the London Basin ; to the south the narrower syncline of the Hampshire Basin.

Ireland consists of a great limestone plain in the centre largely covered with glacial deposits and surrounded by rocks of older date. The mass in the north was formerly continuous with the Scottish Highlands ; that in the south-east with Wales.

Minerals.—Of the mineral output of Great Britain about 90 per cent. is represented by coal (including anthracite). Iron ore, though important, is only about 1·5 per cent. All the other

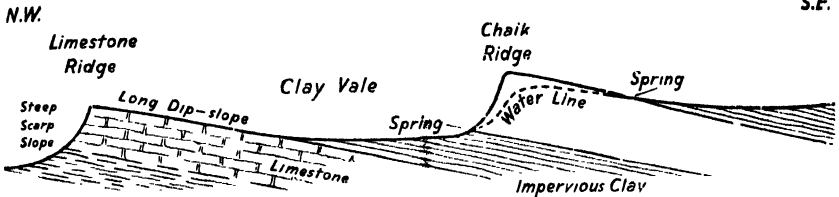


FIG. 496.—Diagrammatic section illustrating the succession of clay vales and limestone ridges found in the south-east of England.

minerals, of which the annual value is over £1,000,000, are non-metallic, and include limestone and chalk (for cement), and limestone for building stones, igneous rocks (specially granite for building and road stone), slate, clay for bricks, salt, china clay, and sandstone. Of the metallic minerals for which Britain was once famous, tin ore is the only one of any considerable value. The mining industries in Great Britain give employment to over a million people in normal years.



FIG. 497.—Section across the Weald from north to south.

Coal.—Reference has already been made to the disposition of the British coal fields. The following table is appended to show the relative importance of the fields (figures in millions of tons) :—

Field	1909-13	1922-24	1927-29	1931-35
Scotland	41	37	34	30
Northumberland	14	14	14	13
Durham	40	37	36	29
South Wales	51	52	46	35
Yorkshire	39	45	45	39
Notts and Derby	29	30	29	27
Warwick and Leicester etc.	—	14	13	14
Lancashire and N. Staffs	30	26	22	20

The quality of the coal differs from one field to another. Anthracite is practically restricted to the western part of the South Wales field; other coals of South Wales are particularly celebrated as steam coals. It should be noted that practically all the coal raised in Great Britain is of Carboniferous age; there are practically no brown coals.

Iron Ores.—Although the prosperity of the iron and steel industry of the British Isles was consequent to a large extent upon the association of iron ore and coal in the coal fields, comparatively little of the iron ore now mined is from coal-field regions. The most important iron ores are the bedded sedimentary ores of low grade but huge extent and easily mined, occurring in the Jurassic rocks, especially in the Cleveland field of Yorkshire, and in the Midlands. The coal field where iron ore is still mined in considerable quantity is North Staffordshire. The Cumberland and North Lancashire iron ores, mined especially near Barrow, are purer ores and occur as masses in limestone.

Metals.—Amongst metallic minerals the once famous tin fields of Cornwall have now but a small output. There is a small production of wolfram from the same area, but that of copper is now almost negligible. Lead ore is widely distributed in the British Isles, but the workings are all small; and lie mainly in northern England, Derbyshire, and in the Lead Hills of southern Scotland.

Non-metallic Minerals.—The British Isles are well supplied with building stones and road metal. Amongst the former may be specially noted the grey granite of Aberdeen and the handsome Shap granite of Cumberland; the magnesian limestones of the north-east of England; the Portland oolites and Bath freestones of the Portland and Bath districts respectively. Enormous quantities of limestone, including chalk, are burnt for the production of lime and Portland cement—the cement works using chalk on the lower reaches of the Thames and Medway are especially noteworthy. The china clay industry of Devon and Cornwall is also important; the china clay occurs as an alteration product overlying certain of the granite masses, but especially near St. Austell. Formerly clay for brickmaking was widely dug in many parts of the country, but there has been a marked tendency to the concentration of the industry in a few areas—notably at Peterborough. The fireclays and ganisters of the coal fields have, of course, special uses, and so have the pure white pottery clays such as those of Poole. The slates of North Wales and Devon-Cornwall are less important than formerly, owing to the decrease in popularity of slate as a roofing material, but the decrease in importance of the Scottish oil-shales is partly the result of exhaustion, partly of the competition of foreign crude oils. The most famous area for salt is Cheshire. Mention

should be made of the fine moulding sands of the Midlands, very important in the iron industry.

It may be noted here that Ireland is poor in minerals, which are practically restricted to small supplies of coal, aluminous iron ores, granite, and marble.

Climate.—The British Isles have a milder and more equable climate than any other land so far away from the equator. This is due mainly to the warm North Atlantic Drift and the continual influence of the warm moist “Westerlies” or south-west Anti-

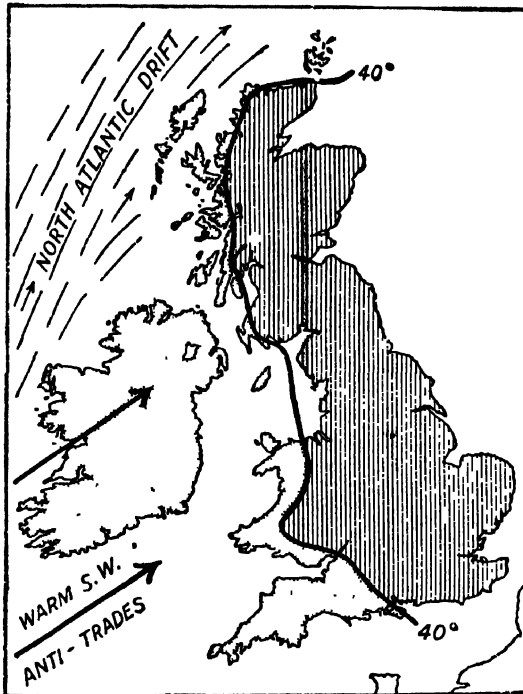


FIG. 498.—British Isles—January isotherms.

In winter the west coast is kept warm by the North Atlantic Drift, and so the whole of the west coast is warmer than the east coast. Compare the temperature line of 32° shown on Fig. 486.

Trades. In winter the east is colder than the west, in summer the north is colder than the south. See Figs. 498 and 499, compare them with 486 and 487. The highest land is in the west, so the greatest rainfall is in the west; Eastern England lies in the “rain-shadow” of the Pennines and western mountains. Although the *general current* of air is from the south-west, actually the daily weather in the British Isles is determined by a succession of cyclones and anti-cyclones which like eddies or whirls in the main current tend to cross the North Atlantic from west to east, and pass over

the British Isles. Wet, stormy, and changeable weather is usually associated with cyclones; fine, settled weather (often with fogs in winter) with anti-cyclones.

By reference to world conditions (see Chapter III in Part I), it will be remembered that the British Isles lie between the high-pressure belt which encircles the globe in the neighbourhood of the Tropic of Cancer and the low-pressure belt which encircles the globe in the neighbourhood of the Arctic Circle. The former belt reaches its greatest intensity about the Azores; the latter about

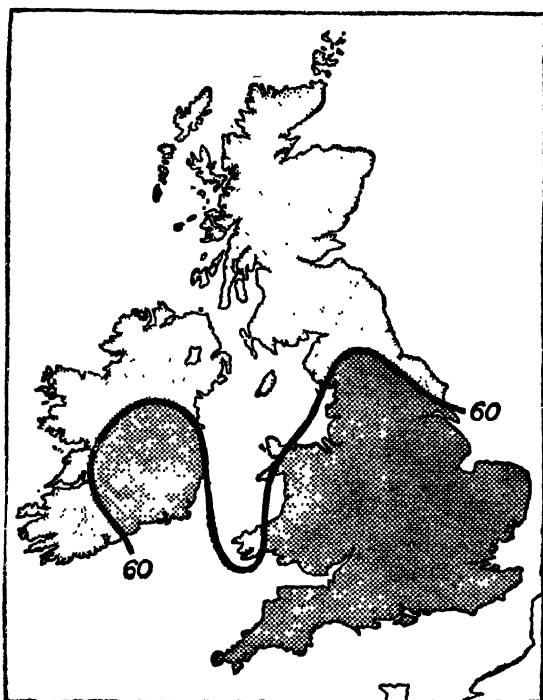


FIG. 499.—British Isles—July isotherms.

The sun is shining over the northern tropic, and the south of the British Isles is warmer than the north.

Iceland. Hence the constant reference in British weather reports to the permanent high-pressure centre over the Azores and the permanent or semi-permanent depression over Iceland. In winter, owing to the cold, there is a high-pressure area over Eastern Europe; in summer it is a low-pressure area. It will be obvious that the British weather is determined very largely by the relative strength or importance of these three permanent or semi-permanent pressure systems, which are, actually, closely related to normal world conditions. The rainfall in the British Isles is evenly distributed through the year (see Fig. 48), there are no extremes of temperature.

so that evaporation is comparatively small. As a result, although the rainfall in parts of Eastern England is as low as 20 inches per year, it is ample for agriculture, and it is rarely that the countryside

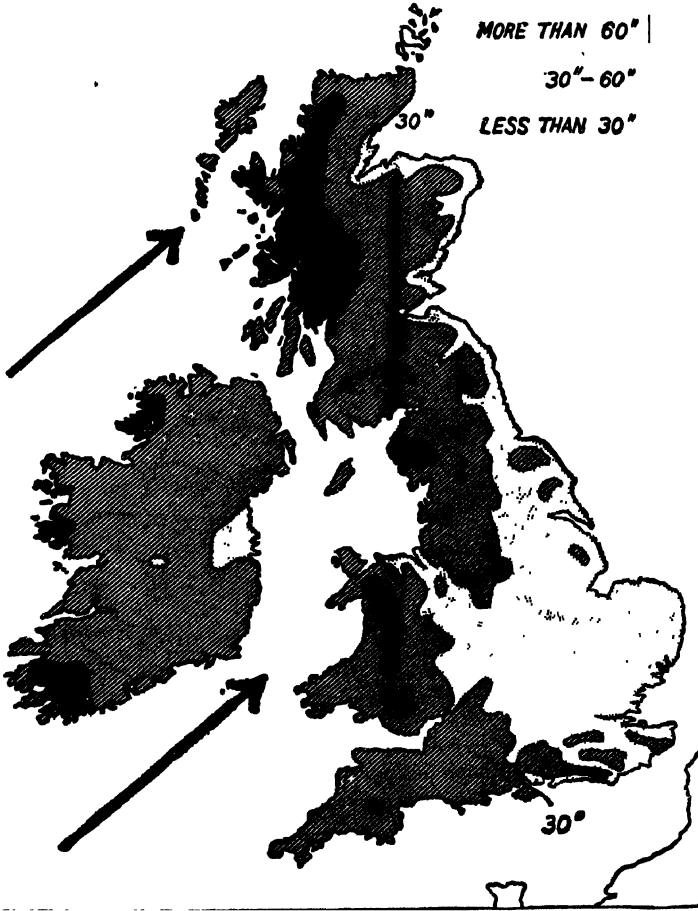


FIG. 500.—British Isles—Rainfall map.

Notice that the heaviest rainfall is on the hills and in the west. The arrows show the direction of prevailing winds.



FIG. 501.—Section across the Pennine Range, showing the rain-shadow area on the east.

is sufficiently long without rain for even the grass to become dry and brown.

Natural Vegetation.—The natural vegetation of the British Isles has now been so largely removed that it is difficult to picture the country as it was. Broadly speaking, the whole of the lowlands must have been clothed with thick deciduous forest of oak, ash,

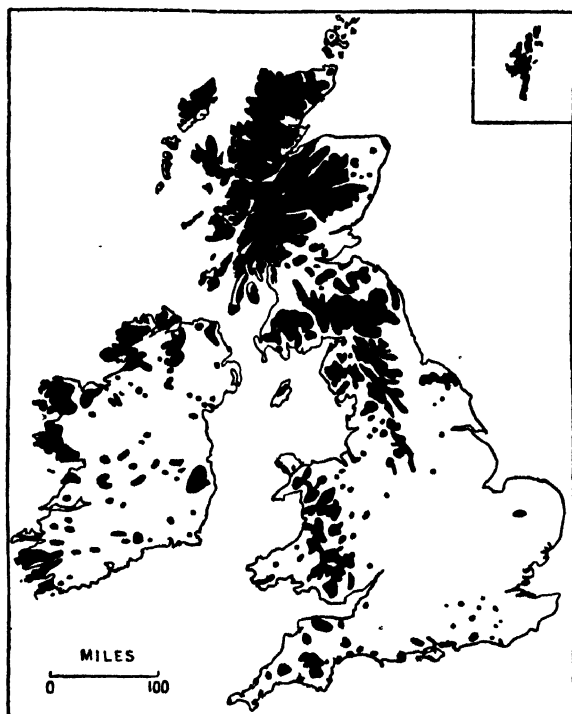


FIG. 502.—Rough hill pastures in England and Wales.

This map should be compared very carefully with the physical map. It will be seen at once that most of the moorland which, because of its use as rough grazing land, is broadly synonymous with "rough hill pastures," lies in the highland half of Britain. It occupies most of the Highlands of Scotland, the Southern Uplands, the Pennines, the heart of the Lake District, and the higher parts of Wales. Smaller areas appear on the granite masses of Devon and Cornwall, on the North Yorkshire hills, as well as on low-lying tracts of very sandy soil, as in the New Forest. In Ireland the predominance in the wet, mountainous west should be noted.

beech, birch, and other common trees of the countryside. Extensive tracts of marsh land, such as the Fen country and Romney Marsh, formed breaks in the spread of forest, whilst rising above it were the moorland tracts of the Welsh Highlands, the Pennines, the Southern Uplands and the Highlands of Scotland, as well as the grass-covered downs of the chalk country. On sandy tracts and in the north, in Scotland, coniferous forests replaced the deciduous woodland,

and even on low ground the heaths, still so typical of sandy soils, must have existed much as they are at present. It is interesting to notice that the settlements and highways of the early Britons avoided the low grounds, for these were only thick forest or marshes, and are found on the high ground, which is, at the present day, the location of comparatively few villages or towns. Whilst the ancient forests have now been so largely removed, the British Isles still have many trees though few forests: numerous small woods, hedgerows with isolated trees and "park-like" country are characteristic of the country. The following table shows the utilization of the surface in the British Isles:

	Woods and plantations	Rough grazing land	Permanent pasture	Arable	Other land
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
England	5	11	43	27	14
Wales	5	34	42	12	7
Scotland	6	67	8	16	3
Irish Free State . .	1.4	12	72		14.6

The small area covered by woods and plantations in all parts of the British Isles is noteworthy, and much agitation has been directed of recent years, inadequately supported by public opinion, regarding the need for afforestation. Most of the "rough grazing land" is the heather-covered moorland and the heathland which covers such huge areas of the uplands. The high percentage in Scotland is particularly noticeable.

Agriculture.—The relative importance of agriculture in Britain is perhaps best gauged by noting the value of primary production and manufactures. These figures are for *Great Britain*:

	£
Agriculture (1923-31)	267,000,000
Fisheries (1923-31)	18,000,000
Mines (1923-31) ¹	206,000,000
Manufactures (1924)	3,853,000,000

The figure given above for agricultural produce is the value of produce sold off the farms (excluding, therefore, consumption in farmers' households) and is made up as follows:

	£
Farm crops	54,000,000
Live stock	101,000,000
Dairy produce	65,000,000
Wool	3,800,000
Eggs	19,000,000
Miscellaneous	24,000,000

¹ The value of the mineral output has fluctuated widely in recent years owing to disturbances in the coal industry. The 1926 total was £143,000,000. Figures from *Statesman's Year Book*. 1930: £188,000,000; 1933: £152,000,000

In its broad lines the distribution of the different types of agriculture in Great Britain is controlled by geographical factors; in the details of development, especially in recent years the economic factors are more noteworthy. The three maps, Figs. 502-504, illustrate the first point. Most of the hilly western counties of England; Wales, and large parts of Scotland, have nearly half

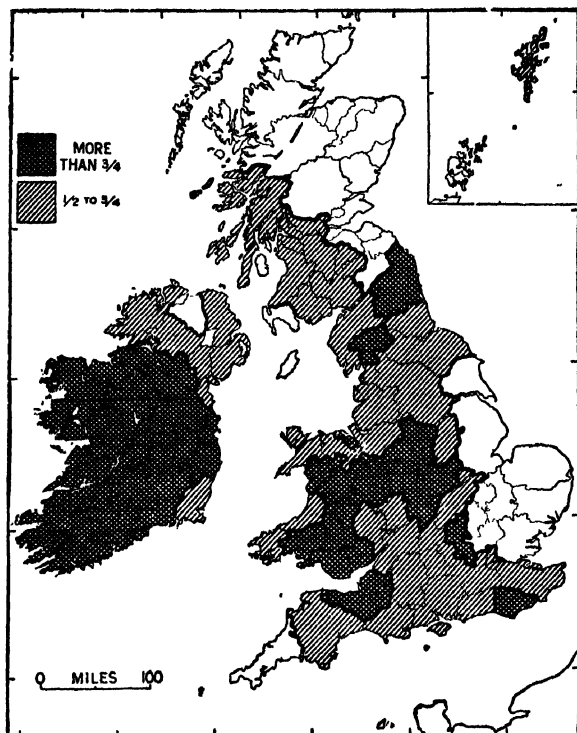


FIG. 503.— Permanent grass in the British Isles.

If one takes the area of each county of the British Isles which is under crops and grassland, one finds that in the whole of the area shaded on this map permanent grassland occupies more land than crops. In the darkly shaded area, the area under grass is more than three times that under crops. In the one unshaded Irish county there is almost an equality. Notice the factors favouring permanent grass: low ground and good rainfall.

their surface occupied by moorland—or “rough hill pasture.” Turning to the plains of the midlands and south-eastern England, Fig. 503 shows that permanent pasture occupies more than half the total area in most of the damper, western counties of the Midlands; arable land more than half the total area only in the drier eastern counties (Fig. 504).

An essential characteristic of the intensive agriculture of Great Britain is the crop rotation. There are three main systems which have been practised ; two are still used.

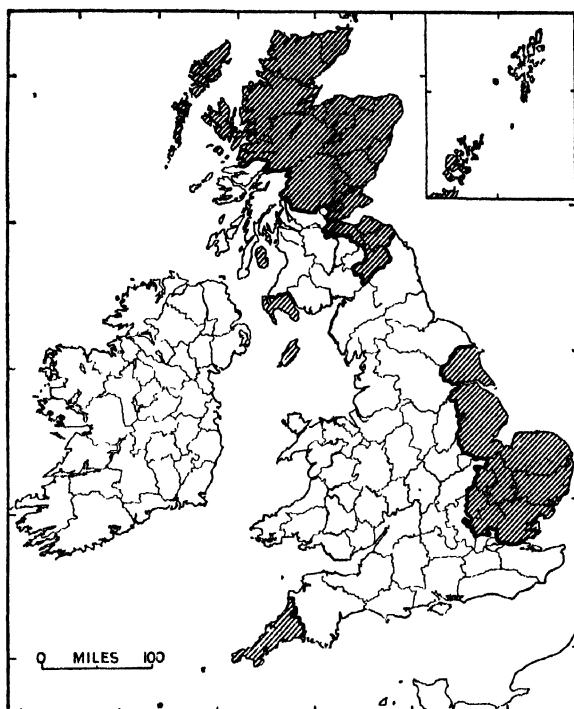


FIG. 504.—Arable land in the British Isles.

This map is the complement of Fig. 503. Each county shaded has more land under the plough (i.e., with crops) than under permanent grass. In England it is easy to see that the chief factor concerned is climate—the counties, with the exception of Cornwall, are all on the drier side of Britain. In southern Scotland the same factor operates, but in the Highlands of Scotland it may be said that if land is worth “improving” from the main mass of moorland, it is ploughed rather than put down to permanent grass.

	Mediæval	Old Norfolk system	Modern
1st Year	Fallow	Clover	Clover, or rye grass
2nd Year	Rye or wheat	Wheat	Wheat
3rd Year	Barley or peas	Turnips	Potatoes, or root crop
4th Year	—	Barley	Oats, or barley
5th Year	—	—	Barley

Clover or other leguminous crops are very important factors in the scheme since, as a result of bacteria living in their root nodules capable of "fixing" atmospheric nitrogen and converting it into nitrogenous plant foods, they *add* to the fertility of the soil instead of detracting from it.

Mixed farming with high crop-yields is thus characteristic of British agriculture. There has been a steady decrease in area of arable land in the last half-century, only partly offset by the increased importance of dairy-farming. The causes are economic.

Wheat.—Wheat occupies about 1,800,000 acres (1933–1937) in England and Wales, but only about 100,000 acres in Scotland, where the northern limit for its cultivation is reached, and 50,000 acres in Ireland, which is, on the whole, too damp.

Barley.—Barley occupies about 1,200,000 acres (1923–30) in



FIG. 505.—The wheatlands of the British Isles.

Notice that they are mainly in the dry south-east. The west of England is too wet; Scotland is too cold.



FIG. 506.—The oat-growing regions of the British Isles.

Oats, like wheat, grow in the drier east, but they can ripen with a colder summer than wheat, and so are largely grown in Scotland.

England and Wales, but again less than 100,000 acres in Scotland and about the same in Ireland.

Oats.—Oats cover alone 1,800,000 acres in England and Wales, and more than 900,000 acres in Scotland, and nearly 1,000,000 acres in Ireland. The ability of oats to withstand the cooler, damper climate of the north and the damper climate of Ireland is well shown.

Root Crops.—Turnips, swedes, and mangolds (all largely used for cattle and sheep food) occupy more than 1,000,000 acres in Great Britain and a further 350,000 acres in Ireland. Potatoes, occupying 650,000 acres in Great Britain, cover no less than 550,000 in Ireland.

Hay.—Hay and fodder crops cover more than 6,000,000 acres in England and Wales; more than 600,000 acres in Scotland, and more than 2,750,000 acres in Ireland.

Peas and Beans are other important crops; in recent years

sugar beet has been growing rapidly in importance in the dry eastern counties of England. The flax of north-eastern Ireland now occupies but 10,000 acres.

Orchards.—Fruit orchards occupy 250,000 acres in England and Wales; 1,290 acres in Scotland. Special mention may be made of the cider-apple orchards of Herefordshire, Devon, and Somerset, and of the fruit orchards of the "home counties" supplying the London markets. Kent, along the fertile northern slopes of the North Downs is, *par excellence*, the county for "small fruit"—raspberries, strawberries, currants, gooseberries, etc.—which cover 70,000 acres in England and Wales, and 8,000 in Scotland (mainly in the sheltered valleys of the east coast). Hops are mainly of importance in the Weald of Kent (25,000 acres in England, none in Scotland).

Live Stock. Horses.—With the increase in motor transport and the mechanization of farming, horses are rapidly decreasing in numbers. In 1938 there were only a few over 1,000,000.

Sheep.—England has long been famous for wool of excellent quality—so excellent that there was still, until very recently, a small export for special purposes to the United States—and sheep number about 17,000,000 in England and Wales; 7,500,000 in Scotland (1930), and 3,500,000 in Ireland. There is a somewhat remarkable specialization, and distinct breeds tend to be strictly localized. The famous Lincoln and Leicester breeds are localized to a considerable extent in those counties; the Southdown on the chalk downs of the Southern counties; the Romney Marsh on that damp flat stretch in southern Kent. The chalk downs afford some of the finest pasture in the country; the sheep which are bred on the rough hill pastures of Wales and Scotland tend to be inferior in the quality and yield of wool and, sometimes, mutton. It is, however, dangerous to generalize too far.

Cattle.—There are 6,275,000 cattle in England and Wales; 1,200,000 in Scotland, and over 4,700,000 in Ireland. It will be noted that in Ireland cattle outnumber sheep, for the damp pastures of that island are pre-eminently suited to cattle rather than sheep. Broadly speaking, half the cattle in the British Isles are classed as "beef cattle" half as "dairy cattle." In Great Britain the dairying industry is directed in the first instance to supplying the huge demand for milk—the production in 1930–31 was estimated at 1,425,000,000 gallons—and secondly for butter and cheese. Formerly the seats of the dairying industry were dictated by the existence of suitable rich damp pastures; latterly the prime factor is one of markets and marketing arrangements—hence the now very important dairying industry in the dry eastern county of Essex near the great metropolitan area of consumption.

Pigs.—Although there are more than 3½ million pigs in Great

Britain and nearly 1½ million in Ireland, the bacon industry is not as prosperous as it should be, and pork and ham are of greater importance than bacon.

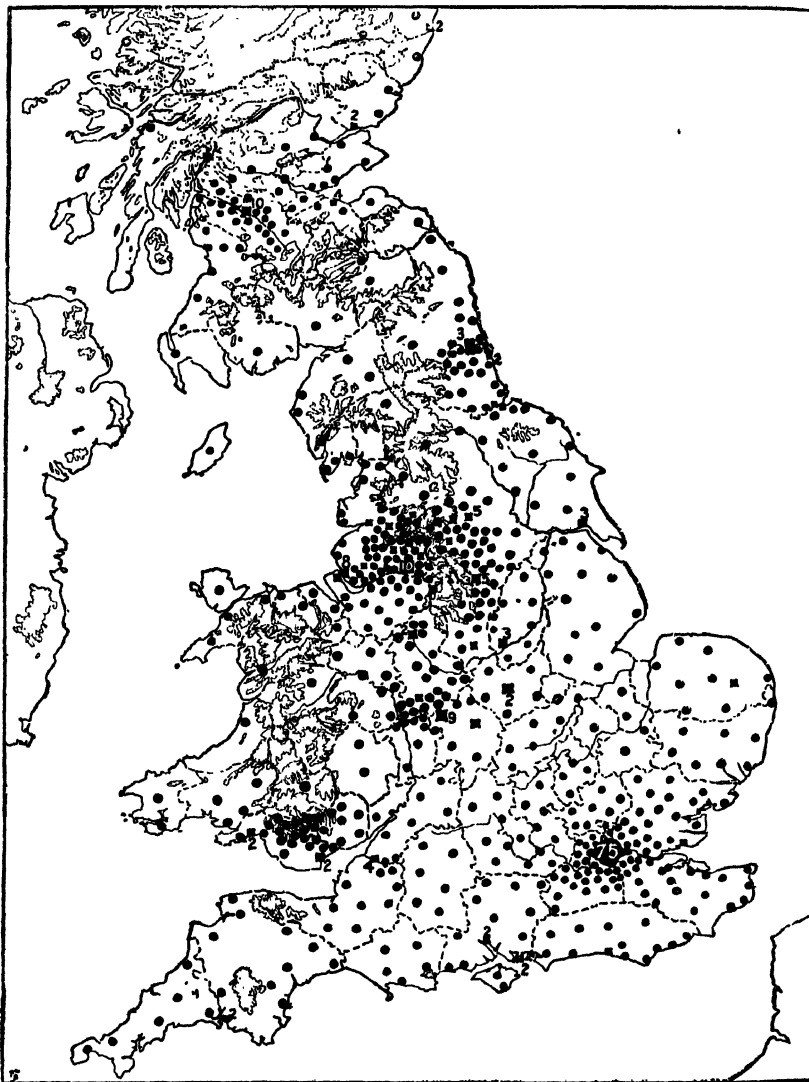


FIG. 507.—Population map of Great Britain (Census of 1921).

Each round dot represents 50,000; each square dot represents a town with over 100,000 inhabitants. The figures marked against each town with over 150,000 people show the population to the nearest hundred thousand. The figure 75 for London is Greater London. Croydon and West Ham have not been separately shown. Notice the concentration of population on the coal fields.

Fisheries.—The fisheries of the United Kingdom employ about 62,000 men—or in all give employment to double that number.

The annual "catch" is about a million tons, worth about £15,000,000, but a considerable proportion of this is from distant waters. Herrings comprise half the catch, cod 15 per cent. and haddock 10 per cent. No less than 27 per cent. (1930-35) of the whole catch is exported. By far the richest fishing grounds are in the North Sea, so that the leading fishing ports—Grimsby, Aberdeen, Hull, Yarmouth, and Lowestoft—are all on the east coast. The pilchard fisheries were once important off the south-west; there is a considerable amount of fishing in the Irish Sea (port: Fleetwood). Oysters are important at Whitstable and on the Essex coast, the annual value of shellfish being over £500,000.

Population.—At the census of 1931 no less than 80 per cent. of the population of England and Wales (32 million out of 40 million) were classed as "urban," leaving only 20 per cent. rural. The latter percentage is steadily decreasing. In Scotland the corresponding percentages are 77·3 and 22·7. In England and Wales no less than 47 boroughs (and in Scotland 4) were found in 1931 to have populations exceeding 100,000—more than in India with a population of 353,000,000. In Great Britain only about 8 per cent. of the population are farmers; by far the greater number are concerned with manufacturing industries, commerce, and transport services.

Manufactures.—Two features are characteristic of the distribution of manufacturing industries in the British Isles. One is the marked coincidence of the great industrial areas with the coal fields, and the other is the marked specialization of individual areas. The first point will be made clear by comparing Figs. 508 and 494. It is true that the increased use of electricity, in particular, is promoting decentralization, but the change is only beginning to be widely manifest and is marked by the increasing importance of factory industries in the south-east. The second point is illustrated very roughly in Figs. 508 and 511.

Textiles.—The products of the various textile industries make up nearly 40 per cent. of the total value of British exports of home origin (1909-13, and 1924). The percentage was 30 in 1934.

The *cotton industry* is the greatest yet in England, the spinning and weaving of cotton are almost restricted to the west side of the Pennines, mainly to that part of Lancashire which lies south of the Ribble, and in Scotland to Glasgow, and other manufacturing towns of the west. The damper atmosphere west of the Pennines has been an important factor in this localization. Manchester (with Salford) is the great centre; Oldham and Bolton are great spinning towns whilst Burnley, Blackburn, Preston, Bury, and Rochdale are weaving towns. For its supplies of raw cotton Lancashire is still mainly dependent on Liverpool, but supplies come also direct to Manchester by the ship canal. According to

the 1924 Census of Production, Britain produced cotton yarn to the value of £187 millions (of which 11·8 per cent. were exported), and piece goods to the value of £157 millions (of which 85·7 per cent. were exported). Miscellaneous cotton manufactures totalled £12·7 millions.

The *woollen industry* is centred in the West Riding of Yorkshire, especially around Leeds. The narrow dales to the west of Leeds are filled with larger or smaller manufacturing towns engaged in the industry, for the most part established in the Middle Ages

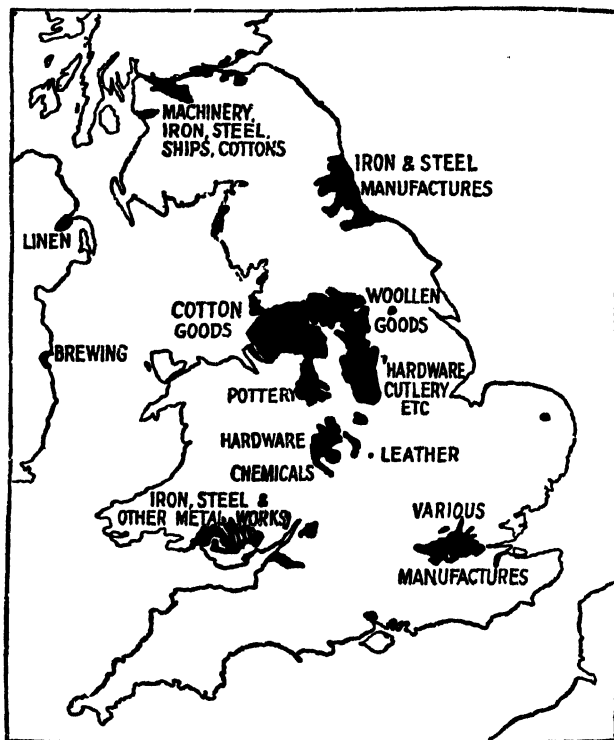


FIG. 508.—The industrial regions of Great Britain.

Notice that they are nearly all situated on coal fields.

when suitable water for scouring, supplies of fine lustrous wool from the neighbouring moorland pastures, and the low cost of living, were the great advantages offered by these locations. Bradford is the great worsted centre; other towns engaged in various branches of the woollen industry are Halifax, Huddersfield, Dewsbury, Wakefield, and Barnsley, with hosiery in the Midland towns such as Nottingham and Leicester. In Scotland several towns in the basin of the Tweed are famous for the fabrics known as "tweeds." Other woollen manufactures are carried on in towns of the coal-field regions. In Ireland woollen manufacturing is largely limited to Belfast.

The *silk industry* is pursued mainly in Derbyshire and the neighbouring parts of Staffordshire and Cheshire, at Derby, Ilkeston, Chesterfield, Macclesfield, Congleton, and Leek. The output of silk goods (£9.4 millions in 1924) is now less than that of artificial silk (£10.4 millions in 1924), and in view of the fact that many cotton and woollen firms now manufacture the latter, it is widely distributed.

Jute fabrics are still manufactured mainly at Dundee and Barnsley.

Iron and Steel.—Iron and steel and their products make up nearly 20 per cent. of British exports of home origin. The "heavy industries" have suffered a period of depression since the war from which they have not yet fully recovered, but even so the Census of Production, 1924, gave the output of pig-iron at £35.0 millions, and steel at £149.6, quite apart from the value of the innumerable products. The chief seats of iron-smelting are at and around Middlesbrough (N. Yorkshire) and South Durham; in South Wales, including Newport; in North Lancashire and Cumberland (Barrow, etc.), and on the Midland iron fields. In connection with the manufacture of articles made from iron, two towns in England are especially noteworthy—Birmingham and Sheffield (each with the surrounding district). Shipbuilding is associated with the iron and steel industry especially in the Clyde area, the chief seat of shipbuilding in all its branches in the world, along the Tyne, Wear, Tees, and at Belfast. Railway rolling stock is manufactured at works the location of which is largely determined by the requirements of the railway companies concerned—at Crewe, Swindon, etc. The motor-car industry is especially important at Coventry, Birmingham, and Oxford. The tin plate industry is centred at Swansea in the South Wales Coalfield.

Other Industries.—The making of earthenware and porcelain is associated with the "Pottery towns" of Stoke-on-Trent and its neighbours on the North Staffordshire Coalfield. Alkalis, chemicals, and glassware are important in Cheshire (associated with salt deposits) and South Lancashire (St. Helens, Warrington, Widnes, etc.), Teesmouth and Tyneside. The leather industries are important at Northampton, Leicester, Stafford, and other Midland towns. Paper is manufactured especially where conditions are suitable for the receipt of the bulky raw material and where there are adequate supplies of pure water. North Kent and the Thames estuary have become leading areas.

Communications.—As already noted in Part I (p. 243) the waterways, if we except the very important Manchester Ship Canal, are relatively unimportant in the British Isles, and only carry about $\frac{1}{25}$ th of the traffic handled by the railways. Great Britain has 20,400 miles of railways, grouped since 1923 into four systems—

the London Midland and Scottish (7,464 miles in 1923); London and North Eastern (6,464 miles); Great Western (3,765 miles), and Southern (2,129 miles). It is impossible here to give details of the railways; they should be studied in relation to their direction from the great focus, London, and to the great ports which they serve. The increased efficiency of motor transport and the very excellent road system of the British Isles have led, in the last few years, to greatly extended use of the roads both for passenger and goods traffic.

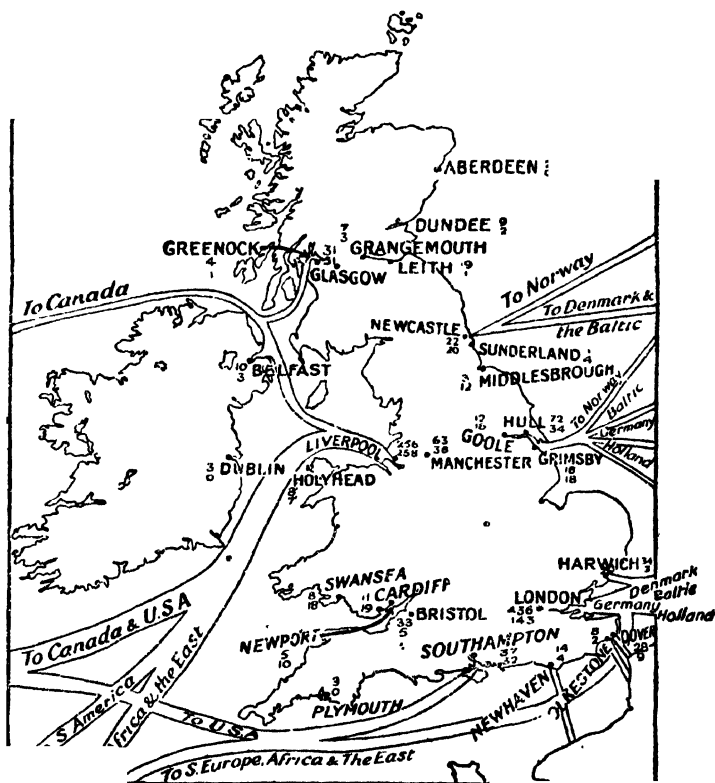


FIG. 509.—The ports of Great Britain.

Ports.—Fig. 509 has been drawn to show the principal ports of the British Isles. The figures marked against each port show the value, in millions of £ sterling, of imports (above) and exports (below).

They demonstrate at once the overwhelming importance of London (579) and Liverpool (514), the next in order being Hull (106), Manchester (101), and Glasgow (82). These figures should only be taken as a rough guide, since they change considerably from year to year.¹

¹ For further particulars of the ports of the British Isles, consult Chisholm's *Handbook of Commercial Geography* (Longmans).

London receives between 33 and 40 per cent. of the imports, deals with over 25 per cent. of the exports, and handles no less than

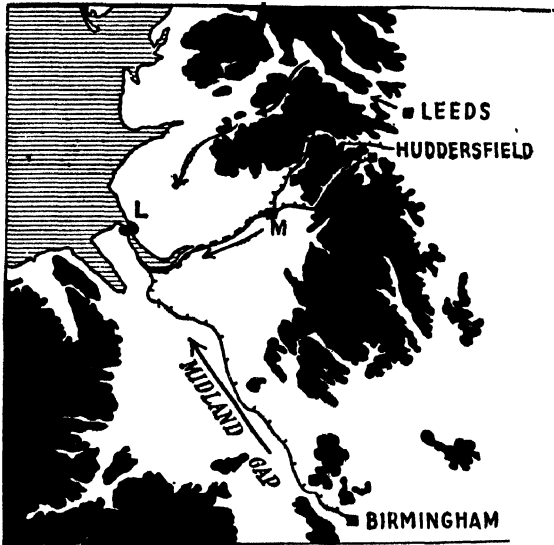


FIG. 510.—Map showing the position of Liverpool.

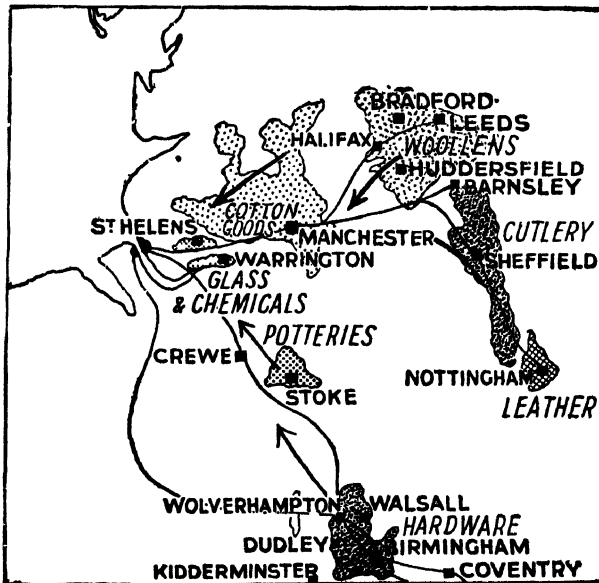


FIG. 511.—The products of the hinterland of Liverpool.

half the entrepôt trade which is so characteristic of Great Britain. Its situation at the head of ocean navigation of a river which allows

access a considerable distance into the interior, nearly opposite the greatest of continental rivers, the Rhine, no doubt determined its early growth and hence indirectly made it the capital of the country, a position which favoured its further increase. The whole port from the tidal limit at Teddington to the mouth between the

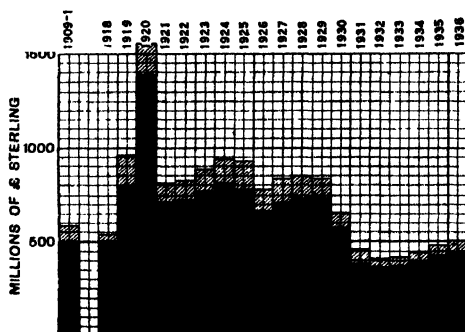


FIG. 512.—The exports of the United Kingdom. Exports of domestic origin in black; exports of colonial and foreign origin shaded.

1920 Total	1,557	Domestic	1,331	(in millions of £).
1933	"	416	"	367
1934	"	447	"	396
1935	"	481	"	426

Isle of Sheppey and Essex is under the control of the Port of London Authority.

Liverpool has risen to high rank only within the last 200 years. Figs. 510 and 511 illustrate the industrial regions situated in its hinterland, regions which are connected with the port by rail.

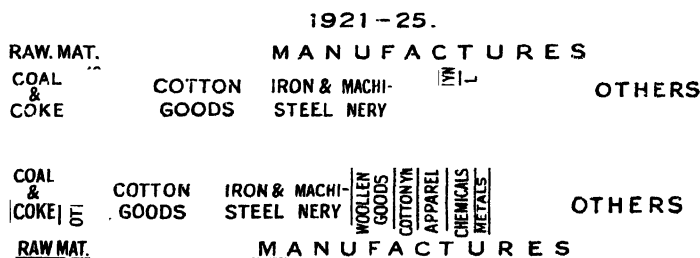


FIG. 513.—The exports of the United Kingdom.

In addition it is necessary to remember the position of the Manchester Ship Canal.

Hull is another of the older ports of England. Most of the ports have a foreign trade which is localized and determined by the regular steamship lines which serve them. Some attempt has been made to indicate this in Fig. 509.

Foreign Trade.—One of the most striking features of British foreign trade is the large excess of the value of the imports over the exports. The “invisible” exports which pay for the excess

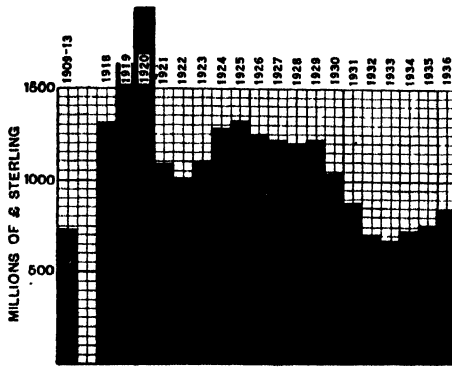


FIG. 514.—The import of the United Kingdom.
1920, 1,033 (in millions of £); 1933, 676; 1934, 731; 1935, 757.

1921 - 25

FOOD & TOBACCO												RAW MATERIALS				MANUFACTURES		
WHEAT	MAIZE	BACON & HAMS	BUTTER	CHEESE	SUGAR	BEEF	MUTTON	FRUIT	TEA	TOBACCO	OTHERS	COTTON	WOOD	WOOL	OTHERS	PETROLEUM	SILK	OTHERS
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

FOOD & TOBACCO												RAW MATERIALS				MANUFACTURES		
WHEAT	MAIZE	BACON & HAMS	BUTTER	CHEESE	SUGAR	BEEF	MUTTON	FRUIT	TEA	TOBACCO	OTHERS	COTTON	WOOD	WOOL	OTHERS	PETROLEUM	SILK	OTHERS
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

1926 - 30

FIG. 515.—The imports of the United Kingdom.

EXPORTS, 1926-30.

BRITISH EMPIRE										OTHERS			
BRITISH INDIA	AUSTRALIA	NEW ZEALAND	CANADA	S. AFRICA	IRISH F. STATE	REST OF BRITISH EMPIRE	U.S.A.	GERMANY	FRANCE	ARGENTINE	NETHERLANDS		
10	10	10	10	10	10	10	10	10	10	10	10	10	10
20	20	20	20	20	20	20	20	20	20	20	20	20	20
30	30	30	30	30	30	30	30	30	30	30	30	30	30
40	40	40	40	40	40	40	40	40	40	40	40	40	40
50	50	50	50	50	50	50	50	50	50	50	50	50	50
60	60	60	60	60	60	60	60	60	60	60	60	60	60
70	70	70	70	70	70	70	70	70	70	70	70	70	70
80	80	80	80	80	80	80	80	80	80	80	80	80	80
90	90	90	90	90	90	90	90	90	90	90	90	90	90
100	100	100	100	100	100	100	100	100	100	100	100	100	100

IMPORTS 1926-30

FIG. 516.—The direction of the foreign trade of the United Kingdom.

General trade: imports include re-exports; exports include British, foreign, and colonial produce.)

include receipts from overseas investments (about one-half the total), receipts from shipping (about one-third), and others. Another striking feature is the huge entrepôt trade; a third, the high place

taken by foodstuffs among the imports and cotton manufactures among the exports. The diagrams should be studied with the greatest care.

THE NATURAL REGIONS OF THE BRITISH ISLES¹

The North-West Highlands of Scotland.—The mainland of the north of Scotland may be described as the wildest and most desolate in Britain, consisting mainly of rocky mountains and heather-covered moorland and bogs. The population consists chiefly of fishermen round the coasts. The Inner Hebrides are also very mountainous and famed for their fine scenery. The Outer Hebrides are populated mainly by shepherds—the making of “Harris Tweeds” is a cottage industry—and fishermen. The Orkneys and Shetlands have, for the most part, a fertile red soil, and considerable areas are cultivated, oats, barley, hay, and potatoes being grown. Shetland is famed for its shaggy little ponies, and there are many sheep and cattle on the islands. The catching and curing of fish, especially herrings, is important. The fertile red soil of the Orkneys is found also on the east coast of the mainland along the shore of Moray Firth. The lower rainfall and sunny climate encourage arable farming.

The South-East Highlands.—As already noted, the south-east Highlands, or Grampians, are separated from the north-west Highlands by Glen More (through which runs the Caledonian Canal used by small steamers) and extend southwards as far as the Highland Boundary Fault. The whole area is a much-dissected plateau, with a general N.E. to S.W. trend of the valleys. The Highland glens are usually wooded; the hills clothed with bracken, heather, and coarse grass. The moors afford summer pasture to numerous sheep (the wool is woven into plaids, blankets, etc.); a few cattle are kept and a little agriculture carried on in some of the valleys. The fiorded, drowned western coast of the Highlands offers a marked contrast to the eastern coast. Here, sheltered from the Westerlies by the Grampians, is a coastal plain with stretches of fertile soil and a drier, sunnier climate suited to agriculture and cattle-rearing. Here lie the fishing ports of Aberdeen, Peterhead, and Stonehaven, the first two also exporting granite.

The Midland Valley.—The rift valley which lies between the two great boundary faults is by no means a flat area. The fertile lowlands are broken by numerous hills marking the outcrops of volcanic rock. The Midland Valley is drained by the Clyde and Ayr flowing westwards; the Forth and the Tay flowing from the Grampians eastwards. The Clyde is navigable by large ocean

¹ Space prevents this section from being adequately illustrated, and the section itself must be regarded simply as a summary. A fuller treatment will be found in *The British Isles* (Longmans), and *A Regional Geography*, Part V.

steamers to Glasgow and is linked by canal with Grangemouth on the Forth. The richest agricultural land in the Midland Valley lies in the east—especially in Strathmore¹ around Perth, and in the Forth valley around Stirling. But the industrial areas are centred on the four coal fields of Ayrshire, Lanarkshire, Midlothian, and Fifeshire. On the Ayrshire field the main centres are Ardrossan and Kilmarnock, but associated with the Lanarkshire field is the great industrial region of the Clyde estuary. The iron-smelting of Motherwell, Wishaw, Coatbridge, and Falkirk no longer depends primarily on local supplies of ore but on imported ore, especially from Sweden. Shipbuilding yards line the Clyde on both banks

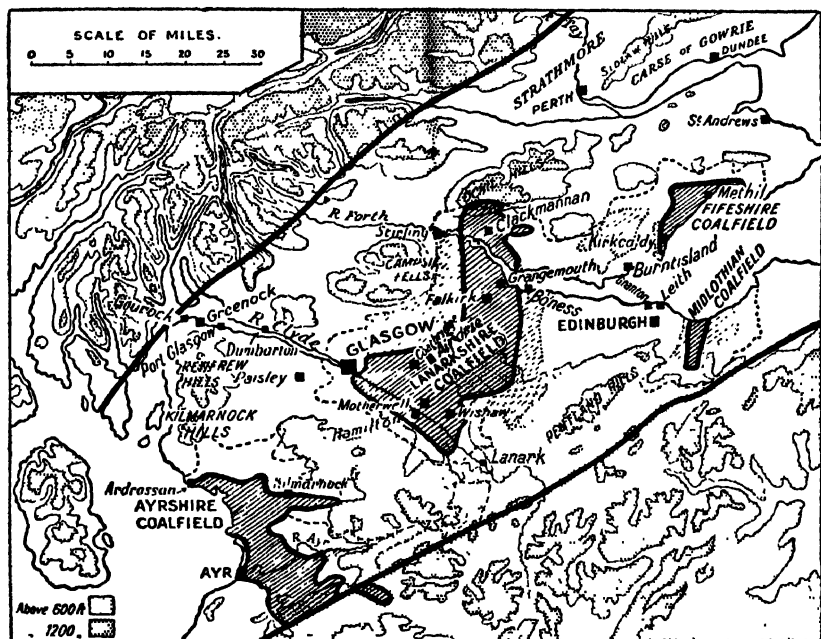


FIG. 517.—The Midland Valley of Scotland.

The main parts of the coal fields (coals of same age as those of England) are enclosed within the heavy lines.

below Glasgow—to Greenock on the south and Dumbarton on the north. The damp climate, as in Lancashire, favours cotton-spinning at Glasgow and Paisley, the latter town specializing in cotton thread. In addition a great variety of domestic articles is manufactured at Glasgow.

On the Midlothian field, Edinburgh, with its port, Leith, is the chief centre, and numbers paper-making, printing, and brewing amongst its industries. On the Fifeshire field, Kirkcaldy is the chief centre.

¹ A "strath" is a broad river valley; Strathmore is in part the valley of the Tay.

In the east of the Midland Valley, outside the coal-field regions, lie the old university town of St. Andrews and the town of Dundee. Supplies of fruit from the fertile Carse of Gowrie in the shelter of the Sidlaw Hills have led to the jam-making industry of Dundee; the demand for sailcloth, ropes, and fishing nets, along the coast led to the flax and hemp industries, and later to the jute industry.

The Southern Uplands.—The old rocks of the Southern Uplands afford but a poor soil and the region is clothed mainly with rough hill pastures. The population consists chiefly of scattered sheep farmers. Bordering the Solway Firth and the south coast are fertile plains largely devoted to dairy-farming. In the east lies the fertile valley of the Tweed. The dry pastures of the surrounding hills support sheep with a high quality wool, and hence the old-established woollen industry of Hawick, Jedburgh, Galashiels, and other towns. Lead is found in the Lead Hills.

The Lake District.—The mountains and valleys of the beautiful Cumbrian massif have a radial arrangement, and the old rocks are wrapped round by younger on all sides. The heart of the massif, with Derwent Water, Grasmere, Windermere, and Ullswater is a favourite holiday resort, and Keswick, Grasmere, and Ambleside may best be described as "hotel-towns." To the north-west of the old massif lies the Cumberland coal field, with Whitehaven, Workington, and Maryport; to the north-east lies the fertile valley of the Eden, with Penrith and Carlisle; to the south-west lies the iron-smelting and shipbuilding district around Barrow.

Geologically the Isle of Man has much in common with the Lake District and serves likewise as a holiday resort for Lancashire.

Wales.—Nearly the whole of Wales is hilly or mountainous, but there is a broad distinction between the complex of old rocks which makes up North and Central Wales and the coal-field region of South Wales. Between the two, on the east, is a wedge of Old Red Sandstone country, partly very fertile, but also forming the desolate moorland stretch of Brecon Beacons. North and Central Wales form a broad stretch of moorland country, with sheep-farming as the chief occupation and the population concentrated in the more fertile valleys. Holiday resorts, such as Llandudno, Rhyl, Colwyn Bay, are noteworthy along the coasts as well as inland (Dolgelly, Bala, etc.). Roofing slate is quarried at Festiniog and other localities in Carnarvonshire. On the eastward flanks of North Wales lies the Flintshire and Denbighshire coal fields. The South Wales coal field, continued westward as the Pembrokeshire coal field, is unique in several ways amongst British coal fields. In the first place, the household coals of the east give place westwards to steam coals and then to anthracite. In the second place, the coal seams occur at two horizons separated by a thick mass of barren sandstone known as the Pennant Grit. The latter gives rise to

great stretches of barren moorland, and the colliery towns are drawn out along the narrow valleys—generally with a trend from north-north-west to south-south-east—which lie amongst the moorland. The great outlets of the coal field are Newport, Cardiff, and Swansea. Large quantities of coal are exported especially to the great coaling stations of the world. Cardiff and Newport have developed iron-smelting and shipbuilding industries; Swansea (with Llanelly and Neath) is the centre of the great tin-plate industry and is also a copper-smelting centre. The tin, formerly from Cornwall, is now imported from Malaya, Bolivia, and Nigeria, and much iron from Northern Spain. Inland smelting centres are Merthyr Tydvil, Tredegar, and Pontypridd.

Devon and Cornwall.—The south-western peninsula, although another massif of old rocks, differs greatly from the Lake District or North Wales. The interior is not rugged but consists of a plateau rising gently to the granite moors which occur at intervals from Land's End to Dartmoor. The tin and copper deposits are associated with the fringe of the granite masses of Land's End and Redruth-Camborne; the china clay with the granite mass near St. Austell. The population of the south-western peninsula is concentrated in the coastal towns and villages; except for the valleys of Devonshire much of the interior is bare and depressing and contrasts strangely with the magnificent coast scenery. The warm equable Scilly Isles and the sheltered southern valleys around Penzance and Plymouth have a considerable trade in supplying cut flowers and early vegetables for the London market.

The North of England.—Under this title it is convenient to consider the broad Pennine uplands—treeless moorland but sparsely populated—and the busy industrial coal-field regions by which they are flanked. The uplands consist of vast stretches of Carboniferous Limestone or Millstone Grit affording dry sheep pastures, and now important as gathering grounds for the water supply of the great towns. The limestone scenery is especially fine in Derbyshire, where steep-sided wooded valleys lend variety to the countryside. Special importance attaches to certain of the passes through the Pennines, notably the Aire Gap and the Calder Gap, which afford communication between Lancashire and Yorkshire.

The Northumberland and Durham Coalfield is associated essentially with iron-smelting and shipbuilding. In addition to the iron-smelting in the Tyneside towns, coal is also supplied to the Middlesbrough area. The Tyne is navigable by large vessels to Newcastle, but the Wear only at its mouth, hence the concentration of shipbuilding at the Tyneside towns from North and South Shields to Elswick and at Sunderland. The proximity of the coal field to the salt mines at the mouth of the Tees has given rise to the chemical works of Tyneside. The chief coal-exporting ports are Newcastle,

Wallsend, Tyne Dock, South Shields, Sunderland, and Hartlepool. The university and cathedral town of Durham, and Darlington with its railway works, should be noted.

The Lancashire Coalfield is associated essentially with the cotton industry of which details have already been given. Engineering works have arisen for the purpose of supplying the cotton-mills with machinery. Wigan is the chief coal-field town. Along the banks of the Mersey are numerous towns engaged in chemical industries and glass-making.

The Yorkshire Coalfield is associated essentially with the woollen industry and, further south, with a variety of iron and steel manufactures, of which the cutlery of Sheffield is most famous. The Yorkshire field continues into Nottinghamshire and Derbyshire, and at the southern end lies Nottingham, with its lace, hosiery, and leather industries.

The Midland Coalfields of North Staffordshire, South Staffordshire, Warwickshire, and Leicestershire are each associated with industrial development. *North Staffordshire* is the pottery region—using local clays and fireclays as well as china clay from Cornwall. The *South Staffordshire* Coalfield supplies the fuel of the famous “Black Country,” of which Birmingham is the centre, and which manufactures a great variety of hardware or small iron goods. There is marked specialization amongst the various towns—Dudley in screws, Wednesbury in nails, Redditch in needles, Wolverhampton in cycles, etc.; Birmingham has a greater variety, including electroplated goods, brass ware, bronze ware, and cheap jewellery. The principal centres of the *Warwickshire* field are Nuneaton and Tamworth, but the manufacturing town of Coventry, with its machinery, motor and cycle factories, lies just to the south. The *Leicestershire* field has no great manufacturing town, but near by is Leicester, with its woollen, hosiery, lace, and leather industries. Although they lie scattered amongst and largely covered by the agricultural lands of the great midland plain, we may here note to the west of the South Staffordshire field the coal fields of Shropshire with the old-established iron industry of Ironbridge, and the Wyre Forest field with the important linen, woollen, and carpet-manufacturing centre of Kidderminster.

The Midland Plain.—A great part of the heart of England is occupied by rocks of Old Red Sandstone, Permian, and especially of Triassic age, which weather to fine rich red soils suited especially to permanent pasture and hence to dairy-farming. Cheshire in particular is a highly developed cattle and mixed farming county; barley, oats, and wheat are widely grown over much of the Midlands. Herefordshire is famous as a fruit and hop county, and in this respect is linked with the stretches of similar soil in Somerset. It has already been mentioned that some small coal fields lie amidst

the Midland Plain ; in the south-west are others—the Forest of Dean, Bristol, and Somerset fields. Most of the towns in the Midland Plain have been, and often are still, market towns serving the needs of the neighbourhood. It is not difficult to see how such industries as the leather industry of Northampton have been fostered by local supplies of raw material. Special mention must be made of the old port and industrial area of Bristol and district ; associated since early days with the West Indian and American trade, and to this day connected with sugar, tobacco, cocoa, and chocolate.

The Scarplands of South-Eastern England.—Although including in its midst the great Metropolis of London, the south-east of England is pre-eminently the agricultural region of Britain. The region as a whole may be said to be bounded on the north-west by the scarp formed by the lowest Jurassic limestone—not always geologically of the same age—which overlooks the Midland plain. The Jurassic limestones give rise to one, two, or three ridges each with a steep scarp face westwards and a gentle dip-slope eastwards. The dip-slope passes into a “clay vale” bounded by another scarp face. Passing Londonwards the best-marked escarpment of all is made by the chalk which lies above all the Jurassic beds and forms Salisbury Plain ; the Chiltern Hills, the East Anglian Heights, the Lincolnshire Wolds, and Yorkshire Wolds. In the counties of Surrey, Kent, and Sussex the beds have been folded upwards into an elongated dome and the chalk cover removed from the centre, thus giving rise to the well-known Weald. North of the wealden uplift lies the Thames Basin filled with later rocks—mostly soft clays and sands—to the south-west of the Weald is the Hampshire Basin. Certain broad stretches of alluvium interrupt the succession of limestone ridges and clay vales—notably the large area of the Vale of York centring at York itself ; the Fenlands around the Wash and Romney Marsh in Kent. Broadly speaking, the limestone ridges afford sheep pastures ; the clay vales agricultural and cattle country. It is in this part of England that one sees the “close,” rich country of small fields separated by hedgerows and cut up by scattered fragments of woodland, which is so essentially “English.” Nearly all the towns one might mention have served their purpose as market towns for the country around. Certain industries which started as cottage industries have survived—such as the “broadcloth” of Stroud, Bath, Frome, etc., using wool from the neighbouring Cotswolds ; whilst it is not difficult to see the reason for the manufacture of farm implements at Norwich.

The phenomenon which is London is gradually affecting the greater part of south-eastern England. High rentals and high rates are encouraging decentralization and the consequent industrialization of such surrounding towns as Slough, Reading, Oxford, Swindon, Southampton, the Medway Valley towns, Colchester, and

Ipswich. The ports of Southampton, Newhaven, Folkestone, Dover, and Harwich are mainly outports of London; much of the prosperity of Bournemouth, the Isle of Wight, Worthing, Brighton, Eastbourne, Ramsgate, Margate, and Southend depend upon their use as holiday resorts by Londoners.

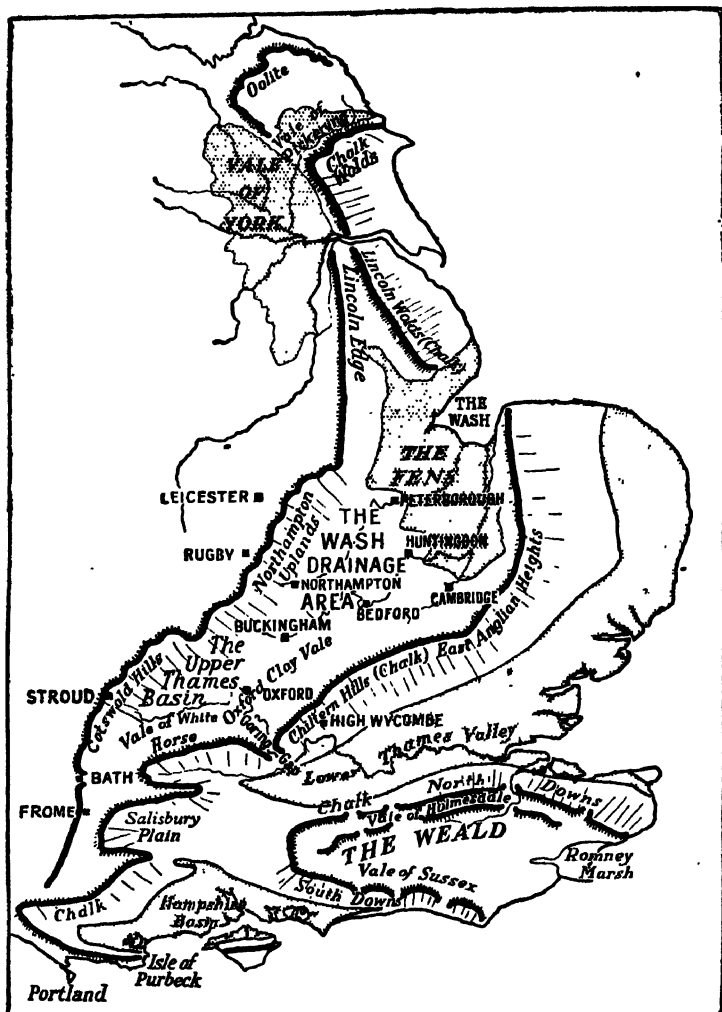


FIG. 518.—The scarplands of South-Eastern England.

The main areas of alluvium and the two great Tertiary basins are dotted.

The hidden coal field of East Kent, now being developed, may result in great changes in what is at present a quiet rural district.

The Channel Islands, including Jersey, Guernsey, Alderney, and Sark, are administered according to their own laws and are

not bound by the Acts of the Imperial Parliament unless specially named in them. Half the arable land is under potatoes, and the islands supply Great Britain with products to the value of between £3,000,000 and £4,000,000 annually, consisting principally of tomatoes, early potatoes, grapes, fresh flowers, and granite. The islands are favourite holiday resorts.

NORTHERN IRELAND

Northern Ireland corresponds to the old province of Ulster without the counties of Donegal, Cavan, and Monaghan. The area is 3,350,000 acres and the population (1926) 1,256,000; hence it is more densely populated than the Free State. The great Antrim plateau is formed of sheets of basalt (the columnar basalt at Giant's Causeway is world famous) whilst the Mourne Mountains are of granite. The most important parts of Northern Ireland are the broad fertile valleys of the Lagan, Bann, and Foyle, where oats and flax are leading crops. Belfast is the capital and largest town, and carries on ship-building (using imported iron), flax-spinning, linen-weaving, cotton-weaving, and distilling. Londonderry (Derry) is also a textile town. The value of the linen export (going outside the United Kingdom) was over £10,000,000 in 1926.

THE IRISH FREE STATE

The Irish Free State, as constituted in 1922, has the same status within the British Empire as the self-governing dominions. It includes twenty-six of the thirty-two counties of Ireland and has an area, excluding large rivers and lakes, of over 17,000,000 acres, with a population in 1936 of nearly 3,000,000. The density is thus low. It has already been pointed out that Ireland, with a damper climate, is more suited to dairying than arable farming. In 1981 the imports exceeded £50,000,000 (75 per cent. from the United Kingdom) and the exports £36,000,000 (over 90 per cent. to the United Kingdom). The leading imports are cereals, coal, iron and steel, clothing and apparel; the exports, cattle, and other livestock; bacon, butter and eggs, and beer. The bulk of the trade is through the port of Dublin.

The Central Plain of Ireland is a great limestone plain covered with impervious clays of glacial origin, so that bogs cover very large areas; where bogs are absent the soil is fertile. The farmers' holdings are generally small—more than half are under fifteen acres. The export of live cattle and dairy produce is mainly from the Central Plain. The Shannon is the largest river in the British Isles and by circumventing the rapid below Lough Derg by a canal it is navigable to Lough Allen. A gigantic scheme recently carried out

utilizes the fall of the Shannon to generate electricity for nearly the whole State. The rim of highlands which in general surrounds the Central Plain is breached in the east, so that Dublin is the natural outlet of the plain, sharing some of the trade with Dundalk and Drogheda. Limerick is the outlet of the Lower Shannon, and lies in the midst of very fertile land.

The Connemara Highlands and Donegal in the north-west of the Free State have a poor thin soil, an excessive rainfall, and are swept by strong winds from the Atlantic. The small population exists in the valleys or by fishing along the coasts.

South-Western Ireland is built up of a series of mountain ridges with an east-north-east—west-south-west trend. In the west the sea has invaded the valleys as long, narrow rias, which form good fishing grounds. The climate of this part of Ireland is very mild, the valleys with their dairy farms constitute some of the most fertile parts of the country, and the beautiful scenery, especially the Lakes of Killarney, attracts many visitors. Cork has one of the finest harbours in the world and Cobh (Queenstown), on an island in the harbour, is a port of call for Atlantic liners.

South-Eastern Ireland is an upland region with a mass of granite forming the lofty Wicklow Mountains. The valleys are fertile, and arable farming is of considerable importance. The fine harbour of Waterford lies in this region; Rosslare is a packet station served by steamers from Fishguard. At Kilkenny is a small coal field.

SCANDINAVIA

Norway and Sweden, which were under one king from 1814 to 1905, may be suitably treated together, since they both occupy the Scandinavian peninsula and have many features in common. The greater part of the peninsula is made up of a high tableland of ancient metamorphic rocks, comparable in age and general character with those of the highlands of Scotland. There are, indeed, many points of resemblance between Scandinavia and Scotland: the fiorded and island-fringed western coasts, and the location of the principal tracts of lowland in the south and east. The Scandinavian plateau is deeply furrowed by narrow river valleys; it is on the whole higher in the south (over 3,000 feet) dropping to about 1,000 feet in the north. Norway occupies the rather narrow strip between the water parting and the ocean, Sweden the area to the east and south. Hence the total area under crops and grass in Norway, notwithstanding the more favourable climate, is only 4 per cent. of the surface against 12 per cent. or more in Sweden.

Although of little use for navigation, the rivers have become increasingly important in recent years as sources of water power. In Norway 2,000,000 H.P. are installed; in Sweden the installed H.P. are about 1,600,000.

NORWAY

Norway has an area of about 125,000 square miles and a population of 2,650,000. The only lands which can be used for cultivation are around Oslo, at the heads of some of the fiords, some narrow valleys, especially the Glommen Valley, and isolated tracts perched high on hillsides. Nevertheless agriculture is the leading occupation; potatoes, oats, barley, and hay are the chief crops, and there are 1,200,000 cattle and 1,900,000 sheep and goats in the country (1926). But the wealth of the country comes from the forests and the fisheries. Forests cover 24 per cent. of the country, and forest products represent a quarter to a third of the exports of the country. Fish and fish products represent another quarter or third of the exports, the principal fisheries being for cod, herrings, "brisling" (sardines), and mackerel. Whaling is still carried on extensively by Norwegians both in Northern Seas and in the Antarctic. Norway has extensive mineral deposits, but owing to difficulties of transport in such a mountainous country and absence of coal for smelting, they have been less exploited than in Sweden. The chief minerals are pyrites and iron ore, some of the latter is smelted

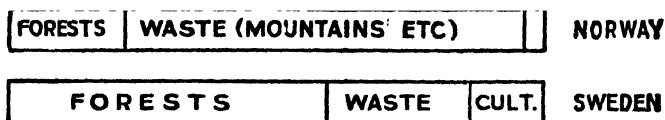


FIG. 519.—Uses to which land is put in Norway and Sweden.

Notice the very small area of cultivated land in Norway.

electrically, and the large output of aluminium from Norway is the result of hydro-electric power. Norway's hydro-electric power is used chiefly in the production of pulp and paper and in the production of electro-metallurgical and electro-chemical products. Among the latter the artificial fertilisers, ammonium nitrate, calcium nitrate, and sodium nitrate, as well as calcium carbide, should be noted.

The pressure on the land has acted in Norway as an incentive to exploration and emigration. The Norwegians undoubtedly knew North America long before that continent was rediscovered by Columbus; Norwegians have settled in every new land, and Norway still has a large merchant navy.

Oslo (formerly called Christiania) is the capital and largest town, exporting timber, wood-pulp, etc. Bergen, on the west coast, exports timber, and is a centre of fishing industries. Near by is the fishing port of Stavanger. Trondheim, farther north, is the third port, and is connected with Oslo by a railway through the Glommen Valley. Railway construction in a mountainous country like

Norway is difficult, and there are railways only in the south of the country except the line to Narvik.

To the north of Norway lie the Arctic Islands of Spitsbergen and Bear Island. These may become important owing to the occurrence of coal. They are foreign possessions of Norway.

SWEDEN

With an area of 173,000 square miles and a population of 6,100,000, Sweden is considerably larger and more densely populated than Norway. There is far less waste land; 12 per cent. of the total surface is cultivated, and forests cover no less than 60 per cent. of the whole. Sweden falls at once into two main divisions, the forested north and the agricultural, lowland south.

Although Sweden has always been an agricultural country, an increasing percentage of the population—now nearly half—is engaged in occupations other than agriculture. The principal crops are oats, rye, barley, and wheat among cereals; potatoes and sugar-beet among root crops; but fodder crops and hay occupy as much land as all the cereals. The fodder crops are required for the 2,750,000 cattle, 1,600,000 sheep, and 1,000,000 pigs. But just as the wealth of Norway comes from the forests and fisheries, so the wealth of Sweden comes from the forests and mines. Forest products represent no less than half the total exports of the country (wood-pulp, 17 per cent.; timber, 20 per cent.; pit props, 1 per cent.; paper, 9 per cent.; matches, 3·5 per cent.—1926–29 averages), whilst mine products, including iron ore (7 per cent.), and iron and steel (7 per cent., 1926–29), make up about a quarter. The mining of iron is most important in the famous Gellivara district, north of the Arctic Circle, where much of the ore is exported through the Norwegian port of Narvik. Swedish ore is valued especially for its high quality. The manufacturing industries of Sweden have grown up gradually and are based primarily on the natural resources of the country, and lately on the use of hydro-electric power. Saw-mills are located all along the shores of the Gulf of Bothnia; the production of iron and steel in Central Sweden dates from a very early period in Swedish history, before the use of coal in smelting gave an impetus to countries not so richly forested. Industries of later growth include the manufacture of electrical and other machinery, paper and matches, chemicals and textiles (using imported cotton). In the agricultural regions of the south are grain and flour mills, dairies, sugar, and tobacco works and tanneries.

The southern, lowland portion of Sweden is often subdivided into three:

The Central Lowlands, with large glacial lakes and glacial soils formerly covered with deciduous forests, now largely

agricultural. This region has a network of canals, connecting the lakes, as well as railways.

The Smaland Highlands, lying south of the lake region and lying between 300 and 1,000 feet above sea-level, less fertile and but partly cultivated.

The Plains of Skane in the south of the peninsula; more fertile and milder than the rest of Sweden, and hence very largely devoted to agriculture and dairying. There is an export surplus of dairy produce, mainly from this region, and most of the Swedish wheat grows here.

Stockholm is the capital of Sweden, and has iron industries. The capital is accessible by canal from *Göteborg*, the chief port of Sweden. *Malmö* is the train ferry station opposite Denmark. The port of *Narvik* in Northern Norway is connected by railway with *Gällivara*, one of the rich iron regions. The ore is carried northwards, as the North Atlantic Drift keeps the ports of Norway ice-free, while those of the enclosed, shallow and fresh Baltic freeze. *Norrköping* has textile works, and *Jonköping* is another industrial town. The saw-mill towns as well as Stockholm suffer from being ice-bound for many months of the year.

Sweden is fairly supplied with railways, and has numerous canals. The most important canal system is that which connects the North Sea through lakes Vener and Vetter with the Baltic Sea.

The exports of Sweden have already been noted; amongst the varied imports cereals, coal and coke, textiles and raw cotton take an important place. Nearly half the foreign trade is with Germany and Great Britain.

THE BALTIC STATES

Along the east coast of the Baltic Sea are four small republics, which are usually known as the "Baltic States." Before the Great War of 1914-1918 they formed part of the Russian Empire, but since the war they have been independent.

The eastern side of the Baltic Sea is part of the great European Plain, and the land is everywhere flat. In most places it is thickly covered by glacial sands and clays, left behind when the Ice Sheet of North Europe melted. The northern part (Finland) consists of a mass of old hard rocks in which the ice sheet scooped out many hollows, now occupied by lakes. The climate is essentially continental, and the winters are very severe. Ice forms over the sea and blocks the ports for part of the year, those in the north being blocked for the longest period.

Finland is the largest of the new republics, and occupies the land north of the Gulf of Finland. Like Sweden on the other side of the Gulf of Bothnia, it is covered with coniferous forests. Timber,

wood-pulp, and paper form 80 per cent. of the exports of Finland. Only in the south of the country are the summers sufficiently long to ripen rye and barley. The principal town and port is *Helsingfors*, or Helsinki. Another port is *Abo* (Turku). Some of the numerous lakes are linked by canals. In the north of Finland is Lapland,

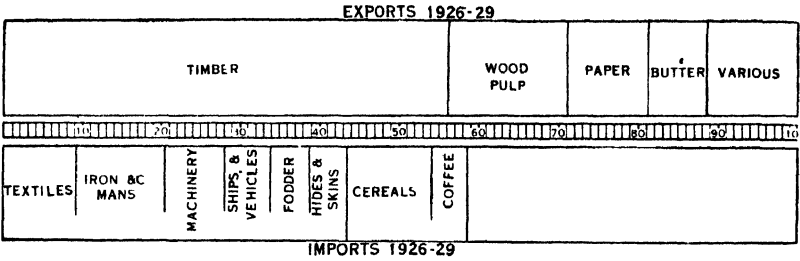


FIG. 519A.—The Trade of Finland.

inhabited by nomadic Lapps, who depend for their existence on their herds of reindeer.

Estonia lies to the south of the Gulf of Finland. Notice that



FIG. 519B.—The Baltic States.

Finland and Estonia, between them, control the entrance to **Lenin-grad** and **Northern Russia**. Nearly a quarter of the land is forested, but nearly all the remainder is cultivated, or used for pasture. The climate is too severe for wheat; rye, oats, barley, and potatoes form the principal food crops. Flax is grown and exported, but the chief exports are timber and paper. The principal town is **Tallinn** (Reval).

Latvia occupies the land round the Gulf of

Riga. The important town and port of **Riga**, on the **Western Dwina**, used to be one of the main outlets for **Northern Russia**. Much of the produce of **Russia** must still pass through **Riga**. The railways of **Russia** are of a broader gauge than those of **Western Europe**, but from **Riga** one can go right to **France** or **Holland** without change of trains.

Unfortunately Riga, being in a gulf, is blocked by ice for many months of the year, but the other ports, *Ventspils* (Windau) and *Liebaja*, are open nearly the whole year. The crops of Latvia are similar to those of Estonia; timber and flax are the staple exports.

Lithuania is larger than Latvia, but has a very short coastline with one port, *Memel*. The principal town is *Kaunas* (Kovno), though the Lithuanians claim as their capital the town of Vilna at present included in Polish territory. The crops are as in Latvia; dairy produce is exported in addition to timber and flax.

The four Baltic States have been founded upon ethnological grounds. The economic stability of these small and naturally rather poor countries leaves much to be desired.

RUSSIA

Position and Size.—Russia or, to use the modern title, the Union of Socialist Soviet Republics (U.S.S.R.), forms the largest continuous political unit in the world. The growth of the old Russian Empire was quite different from that of the British Empire. Russia's growth consisted of a gradual expansion over neighbouring lands and people, so that although the bulk of the territory is a vast plain, the Union includes within its boundaries the tundra dwellers of the far north, the hunters and lumbermen of the great forests, the nomads and later the cultivators of the steppes, and the desert camelmen of Turkistan. In the forceful words of Miss R. M. Fleming,¹ "The Ancient Kingdoms of Georgia and Armenia, with their long tradition of Christian culture, the Moslem Central Asiatic Republics, with their age-long irrigation, civilization, and the glamour of the cities of Samarkand and Khiva and Bukhara, have been gathered into the same political framework as the lowly tribes of far Kamchatka. The larger part of Russian territory lies in Asia, and from remote antiquity waves of population from Asia have washed into and intermingled with waves washing out from Europe, so that Kipling's 'East is East and West is West and never the twain shall meet' emphatically does not apply to Russia."

In the still obvious intermingling of Europe and Asia, Russia stands apart from the rest of Europe. The plains of European Russia are separated from those of Asiatic Russia merely by the low rise of the Urals; the Russian people are of surprisingly varied physical type—some are purely Mongol (there are still enclaves of Tartars in the Crimea and on the lower Volga), others Slav, others even essentially Nordic. But the Slav colonization made the

¹ Lecture delivered to the Geographical Association, January 1931. See also "Studies in Regional Consciousness and Environment," 1930.

Russian nation out of a multitude of materials, and therein is a parallel in Russia with the United States of America. But there is at the same time a vast difference. The area of Russia is $8\frac{1}{2}$ million square miles, and the population 166 million (compare United



FIG. 520.—European Russia : political and general.

States 3 million square miles, population 123 million), but whereas America has largely conquered distance, Russia has set herself the task. Until recently one section of Russia was but dimly conscious of the existence of another, the apparent railway network even of the most settled parts disappears when compared with the real network of Western Europe. The capital of one of the republics composing the Union is still 1,800 miles from a railway.

In this book we are concerned with European Russia—with an

area of nearly 1 million square miles and thus equal to one-third of the continent. Even this fragment of the whole Union stretches 2,000 miles from north to south and from far within the Arctic Circle to latitude 40° N.

Physical Features and Structure.—The essential structural features of Russia have already been considered. Briefly recapitulated they are as follows :

(a) The presence of the underlying stable block of ancient rocks, the Russian platform. Although this block has been resistant to folding, it has suffered slow movements of elevation and depression, and so is largely covered with sediments which are, however,

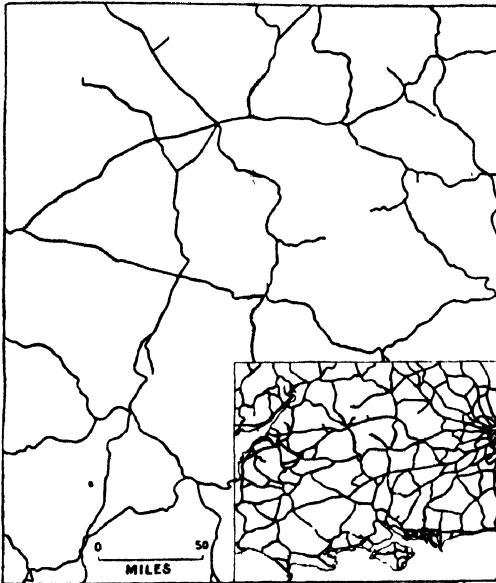


FIG. 520A —Comparative railway networks of Russia and England (inset) on the same scale.

practically horizontal. The movements of elevation and depression have been fortunate for Russia, because amongst the other deposits laid down, are, in two important areas, coal seams. These two areas are the Tula Basin, south of Moscow, and the Donetz Basin.

(b) The Fennoscandian glaciers swept over much of Russia from the north-west, and so the country is largely covered with a mantle of glacial deposits. Sandy ridges alternate with marshy hollows in the forest country of the north ; wind-borne dust or loess predominates in the south. It is largely as a result of the glacial deposits that Russia, though almost entirely a plain, is far from having a monotonous flat surface.

(c) Russia includes in the south the Alpine folds of the Caucasus continued in the Crimea, as well as the low Urals already mentioned.

Minerals.—The minerals of European Russia may be considered in the following groups :

- (1) The Coalfields. .
- (2) The Oilfields.
- (3) The Iron Ores.
- (4) The Minerals of the Urals.
- (5) The Minerals of the Caucasus and Transcaucasia.
- (6) The Minerals of Ukraine.
- (7) Salt.

The Coalfields.—The chief coalfields of European Russia, with their estimated reserves and average productions, are the following :

Field	Millions of tons		
	Reserves	Output	
		1934	1937 est.
Donetz	71,088	60	80
Tula or Moscow	5,930	5	10
Ural	5,038	5.5	13
Pechora	60,000	—	—
Transcaucasus.	189	0.2	1.4

For purposes of comparison the following table shows the position for the coalfields of Asiatic Russia.

Kuznetzk	400,000	11.6	20
Minusinsk	14,000	*	*
Kansk	40,000	*	*
Irkutsk	75,000	3.5	4.5
Tunguz.	400,000	*	*
Bareinsk (Far East)	60,000	*	*
Yakutia	60,000	*	*
Vladivostok	3,775	3.0	6.5
Ferghana	5,263	1.0	3
Karaganda	20,000	1.8	7

* Total minor areas 1934 2.0 ; 1937 estimate 4.5.

In 1913 the total production of coal in Russia was 29 million tons, 87 per cent. of which came from the Donetz Basin. During the Revolution coal production dropped to a very low level, but by 1928, when the First Five Year Plan was put into operation, it was a little above the 1913 level. In 1934 the production had reached

93½ million tons, and the production for 1937 scheduled under the Second Five Year Plan is 152½ million tons. Taking the position in 1934, there are two striking features—the large total increase and the opening-up of the new fields especially in Asiatic Russia. The output of the Donetz Field has doubled, but provides only 64 per cent. of the total. The brown coal field of Moscow is being seriously exploited, and yielded in 1934 5 per cent. of Russia's total. But the fields of Asiatic Russia now yield a quarter of the country's total, compared with 8 per cent. in 1913. This is part of the general plan to develop large centres of industry in all the major divisions of the country. Several of the fields have only recently been discovered or mapped—notably the Pechora field first noted in 1923. Russia is now believed to have 15 per cent. of the world's coal.

A new development has been the utilization of *peat* in the northern half of the country.

The Oilfields.—Russia is second only to the United States in the world production of oil—the output in 1913 of 9,200,000 tons being increased to 25,500,000 in 1934, whilst the scheduled total at the end of the Second Five Year Plan in 1937 is 47,000,000 tons. Oilfields occur :

(a) On both flanks of the Caucasus—on the south by far the most important area is around Baku, producing two-thirds of Russia's oil. The oil is sent by pipe-line to the Black Sea and the pre-War working was by British interests. Oil also occurs near Tiflis. On the north the most important area is around Grozny, other areas including Maikop.

(b) On the flanks of the Urals from the Pechora region in the Arctic north to Emba on the shores of the Caspian Sea. A chain of fields has been discovered, but they are only now being opened up.

Russia also has oil in the Asiatic territories bordering Persia as well as in Sakhalin in the Far East.

The Iron Ores.—The best-known and most important iron ore field in Russia was that of Krivoi Rog in the Ukraine—now known to be part of a huge area lying west of the Donetz coalfield. Near the southern end of the Urals is the famous Magnet Mountain, near which has grown up the great iron and steel town of Magnitogorsk, but this is only one of the important iron deposits associated with the Urals. An important one recently discovered is near Orsk. In the far north rich iron ores occur in the Kola Peninsula, whilst a huge new deposit has been discovered at Kursk in the steppes of Asiatic Russia.

The Non-Ferrous Minerals of the Urals.—Amongst the important minerals of the Urals, the ores of copper take a leading place.

Nickel, gold, platinum are also important, whilst large deposits of potassium salts have been discovered in the north.

The Non-Ferrous Minerals of the Caucasus.—The richness of Transcaucasia in minerals has long been known, but serious exploitation is recent. Copper is important, also manganese; lead

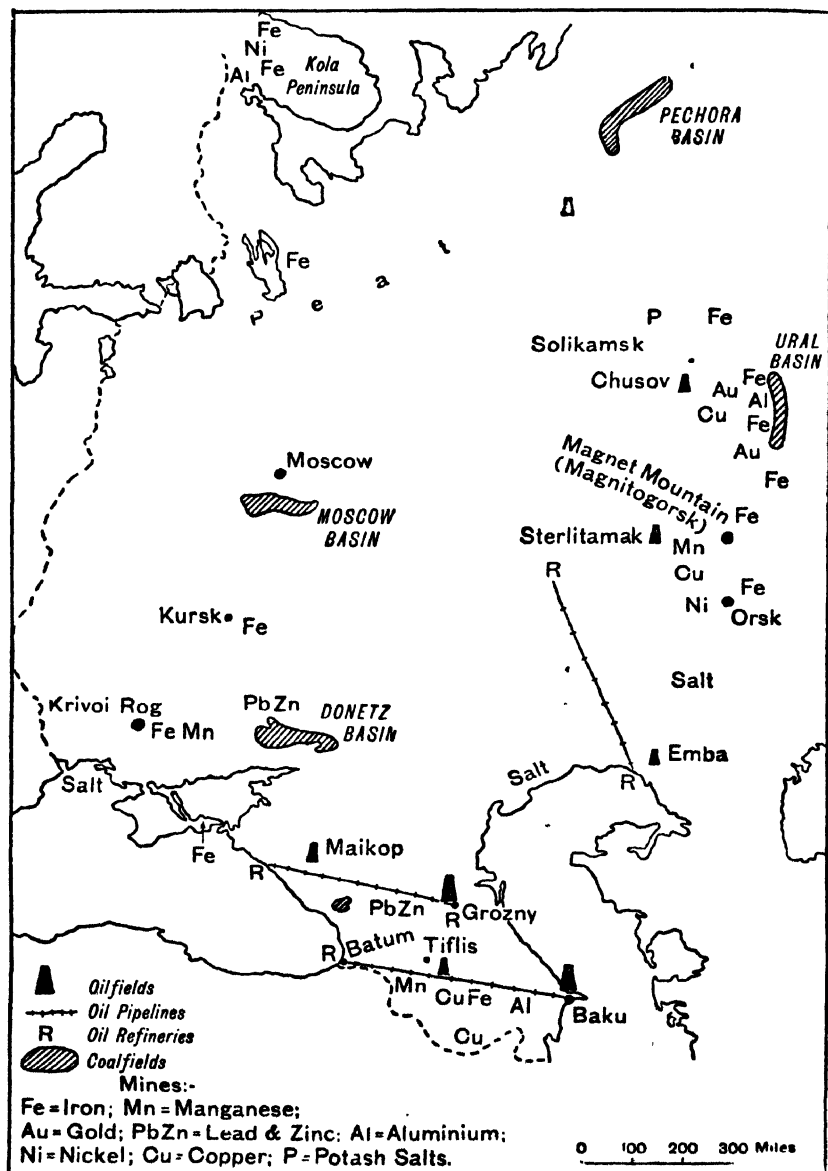


FIG. 520B.—The coalfields, oilfields, and minerals of European Russia.

and zinc are at present mined *north* of the Caucasus and the extraction of aluminium is experimental.

The Minerals of Ukraine and South Russia.—Apart from the iron ore, manganese is important, whilst lead and zinc occur near the Donetsk coalfield.

With the modern unification of Russia, it is useless to consider the European area alone: the reserves of Russian Central Asia and Siberia must be remembered. Some of these are considered in Part IV of this work.

Salt.—Salt is obtained from the dry south-eastern tracts north of the Caspian Sea, as well as from the Black Sea and from the northern and southern ends of the Urals.

Climate.—There are certain outstanding features of the climate of Russia which deserve special emphasis. In winter (as shown in the isotherm map for January, Fig. 14) the whole vast territory, with the exception of a small strip in the south, suffers from an average temperature below freezing. As one goes northwards so the period during which the country is ice-bound steadily increases. During the long winter outdoor occupations such as agriculture become impossible, and a prolonged annual pause in the life of the country is the result. The Moscow district, for example, has a vegetative period when crops are growing of 180 days—less than half the year; in the north, in the Forest Belt, this is reduced to less than 100 days.

In the summer, on the other hand, high temperatures are the rule. Temperatures of over 80° are recorded right from the Arctic Ocean to the Black Sea.

When one considers rainfall, the north has a small but adequate precipitation owing to the high humidity; the centre has, broadly speaking, enough; whilst in the south one passes through the steppe zone, with its spring rains, into the belt of desert round the Caspian. But much of the steppe zone suffers from irregularity of rainfall, so that years of bounteous harvest when complete harvesting presents great difficulty alternate with years of terrible famine when thousands die of stark starvation (as in 1911 and 1921).

Rivers.—The peculiar importance of Russian rivers is really connected with three groups of geographical factors—position, topography, climate. In the first place, because of the enormous size of the country and the consequent inadequacy of man-made highways of road and rail, the rivers play a large part in providing means of communication. But it is unfortunate that more than half the country lies in the basin of the Volga, which drains to the south-east (in the wrong direction) to the desert lands surrounding the sparingly useful Caspian Sea. The important Northern Dwina flows northwards to the Arctic Ocean, the Western Dwina passes

through alien territory before reaching the Baltic. But to the south the Dniester, Dnieper, and Don drain to the Black Sea. In the second place, the low relief is responsible for the enormous stretches of river uninterrupted by a rapid or waterfall. But at the same time it is the low relief—even the Valdai Hills from which the great Volga takes its rise are scarcely a thousand feet high—which cause the tortuous windings and the presence of sandbanks and shallows. It is the climate, however, which really reduces the usefulness of the rivers. Shallowing in late summer is succeeded by winter's grip, and the map shows the period during which the rivers are ice-bound. After the thaw in the spring the rivers are

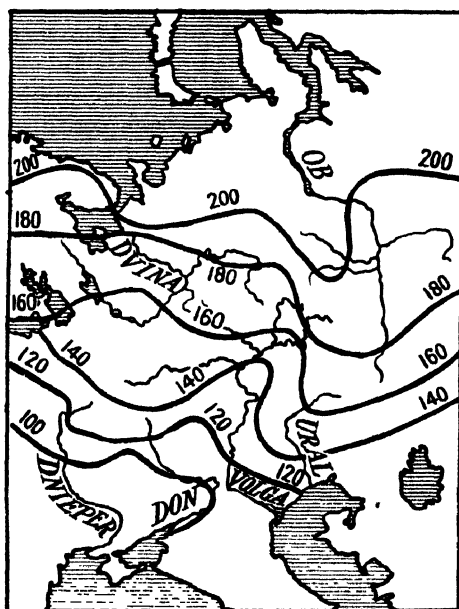


FIG. 520c.—The rivers of Russia, showing the number of days per year on which they are ice-bound.

again for long impeded by floating ice, and navigation is effectively prevented. The usefulness of Russia's rivers could be and is being increased by canal links as noted below, but it should be noted at the same time that the river system has impeded the development of both rail and road owing to the numerous costly bridges required.

Mention must be made of the famous river fisheries of Russia—in particular the sturgeon fisheries. Sturgeon roe furnishes the celebrated caviare.

Soil.—It is to Russian scientists that the credit is due for realizing, that the type of soil produced by weathering depends much more on climate than on the character of the underlying rocks.

It is possible to distinguish in Russia great soil belts running roughly from south-west to north-east.

(a) The tundra soils of the far north are humid and peaty owing to the permanently frozen subsoil (preventing seepage of moisture downwards) and low evaporation.

(b) The podzols or podsolized soils of the forest belt are ash-coloured soils. They are seen on heathland and some coniferous forest land in Britain; the colour has been removed from the upper

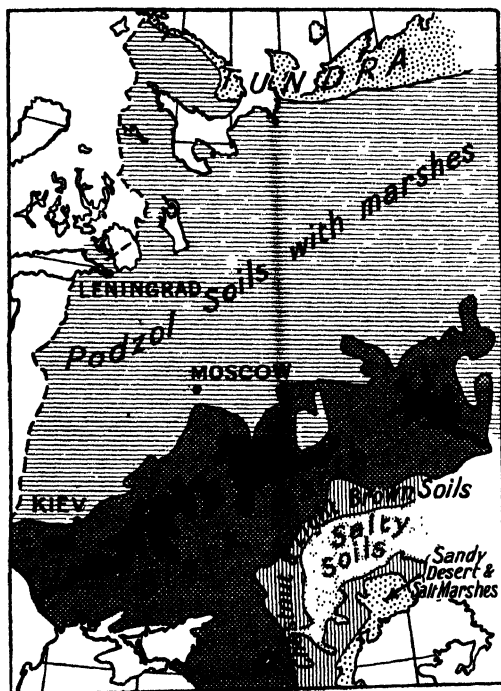


FIG. 520D.—The soil belts of Russia.

The richest parts of the black earth belt are shown in black.
"Podzol" is now the more usual spelling in English.

layers by the process known as leaching, whilst the lower layers are darker because they contain some humus.

(c) The black earth or chernozem soils are the fertile soils of the steppelands produced under conditions of high evaporation in summer and long freezing in winter.

(d) The chestnut brown soils are found in the drier parts of the steppelands.

(e) The saline soils occur round the north of the Caspian Sea.

The Vegetation Belts and Natural Regions of Russia.—Russia was, until recently, essentially an agricultural country: the character of the agriculture depends upon climate and soil, with the

result that the great natural regions of Russia coincide very closely with the regions which may be distinguished on a basis of natural vegetation. Even on a population map the industrial districts of Moscow and Tula are seen to be mere local developments in the midst of a belt of comparatively constant character.

The Tundra Region.—This is the treeless region of the north, where moss, lichen, summer herbs or grass, and dwarf shrubs form the principal vegetation. Agriculture is impossible, the few poor nomadic inhabitants, such as the Lapps and Samoyedes, rely mainly on their reindeer herds and a little fishing in summer. The transport for most of the year is by reindeer or dog-drawn sledges. The most important tracts are usually the more sheltered river valleys, along which tongues of forest penetrate from the south. Owing to the warm waters from the North Atlantic Ocean, the Arctic shores remain free from ice, and *Murmansk*, an ice-free port, has been connected with Leningrad by rail. Attempts are being made to investigate scientifically the possibilities of pastoral industries, whilst a remarkable industrial development has taken place along the railway to Murmansk—associated with mining for iron, nickel, apatite (for manufacture of phosphatic manures) and electric power works.

The Coniferous Forest Belt.—The podsol soils of this belt vary in character from clays to coarse sands, with the result that large areas of marsh may exist on the clayey areas. These marshy tracts have acted as barriers to communication, but at the same time have formed protective barriers behind which such peoples as the Finns have sheltered from invaders. The two chief trees of the belt are the spruce and the Scots pine; the former prefers wet, heavy soils and so predominates on the clayey soils; the latter prefers the drier sandy tracts. The presence of the deciduous birch lends further variety to the forest. Little agriculture is possible in the north of the forest belt, but towards the south extensive forest clearings are cultivated or afford pasture for dairy herds. Rye bread and cabbage soup form the two great staples of the peasant diet. Flax is grown round the great glacial lakes of Ladoga and Onega. In the north hunting, fishing, and lumbering are the staple occupations—agriculture becomes more important southwards; various species of deciduous trees become more numerous, and the coniferous forest belt grades insensibly into the next. *Leningrad* (1,600,000) lies roughly where the southern limits of the belt reach the coast.

Notice the position of Leningrad on a deep inlet of the sea, giving access to the interior of Russia, but at the same time easily accessible by water from the industrial countries of north-west Europe. Leningrad is guarded by the island fortress of Kronstadt, but the new republics of Finland and Estonia now control the entrance to the gulf. Leningrad is blocked by ice for some weeks: *Archangel*, on the White Sea, for five or six months.

The Mixed Forest Belt.—On the accompanying map are shown the approximate northern limits of the oak and the normal southern limits of the Scots pine. Roughly between these two lies the mixed forest belt. Here the cultivation of deciduous fruit trees—apples, pears, and cherries—is possible; agriculture is more important and



FIG. 520E.—Forests belts of Russia.

(After R. M. Fleming.)

more varied. Indeed, the belt is in the main an agricultural one. The chief crops are flax, rye, barley, oats, and potatoes. Flax and oil seeds together with Russian hemp are exported, but not enough grain is grown to feed the people. The surface is far from monotonous: marshes are still numerous in the boggy hollows, but the better drained valleys favour agriculture and the sandy ridges

are largely occupied by Scots pine. Here again the long winter enforces inactivity ; the peasant needs some outlet for his energies during this long, dreary period, with the result that peasant or *koustar* industries are widely developed. In particular the making of wooden utensils of all kinds, woollen clothing, felt boots and caps, homespun linen, furniture, pottery, and toys may be noted. These almost universal peasant industries have had a widespread influence. In the first place, the need for exchange and the difficulty of travel and transport over wide distances led to spécial efforts being made to meet in certain centres at certain times of the year, and so to the institution of great annual fairs, as at Gorky (Nijni-Novgorod). In the second place, the village industry developed naturally in certain areas into a factory industry. This happened in the Moscow industrial region, which was, in pre-War Russia, almost the only industrial area and where now five towns at least—Moscow (2,400,000), Tula, Yaroslavl, Ivanova-Voznesensk, and Kalinin (Tver)—boast a population of over 100,000.

But the scanty returns of agriculture and the enforced inactivity of winter in the forest belts of Russia have had other effects. The first is the wandering in search of seasonal work by large bodies of peasants which has developed into almost permanent nomadism. The nobility of the old Czarist régime found it necessary to enforce serfdom to prevent seasonal loss of labourers ; the present government finds itself in the same position. The encouragement of peasant industries tends to keep the people settled at home ; the inadequate supply of fuel (wood in particular) south of Moscow has been supplemented by the erection of electric power stations, using peat or local coal. Most of the trade from this region passes through Leningrad, since the port of Riga is no longer in Russia.

The Steppe or Grassland Belt.—This belt is not sharply marked off from the last. Oak forests penetrate southwards along the moister valleys, whilst not a little of the most fertile of the "Black Earth region" owes the fertility of its soil to former oak forests. On the northern fringe of the former open oak forests stood *Kiev*. *Kharkov* is another important centre. The rich black soil is ideal for wheat, and this region is one of the great wheatlands of the world. Other crops, grown more for home use, include rye and barley, and, in the wetter south-west, maize and sugar-beet. The south-west of Russia or the steppe region lies in Ukraine. For long under Polish-Lithuanian rule, Ukraine only became completely under Russia at the end of the eighteenth century. Again after the Great War it became a battleground of opposing forces—German and Austrian, French and Polish, as well as Russian. With a large and fertile population, pressure on the land is considerable, so that the most fertile part of Russia is at present not exactly the most prosperous. But the possibilities are great in this vast wheatland.

The whitewashed, orchard-surrounded Ukrainian cottages contrast with the log huts of central Russia and emphasize the difference.

In the steppe belt of Russia lies the great Don coal basin. Nearby are rich deposits of iron ore, and large quantities of pig-iron are produced. Manganese also occurs. The outlet of the whole area is naturally by the Black Sea ports, especially Odessa.

The Desert Belt.—This belt develops with increasing aridity and increasing salinity of the soil south-eastwards from the steppes around the north of the Caspian Sea.

The Southern Crimea.—In southern Russia the climate becomes sufficiently genial for the growth of the vine. In the south of the Crimea, sheltered from cold northerly blasts by the east-west mountain ridge, is a small tract which may even be called "Mediterranean." But there is a tendency to exaggerate grossly its area and importance.

The Caucasian Regions.—Stretching between the Black Sea and the Caspian Sea is the great rampart of the Caucasus Mountains, with its snow-capped peaks and forested slopes. The contrast with the steppes to the north is emphasized by a change in the characters of the people—the typical independence of mountain peoples which is recognized in the present constitution of Russia by the institution of a number of autonomous regions. Across the rampart lie Georgia, Armenia, and Azerbaijan whose peoples for long resisted the Russian yoke and which to-day are independent socialist republics within the federation. The capital and centre of Georgia is Tiflis, of Armenia Erivan, and of Azerbaijan the oil town of Baku.

The Urals.—The Ural Mountains are also famous for their richness in minerals. Platinum, gold, copper, and large quantities of iron ore are obtained, and have given rise to much industrial activity in recent years, including the establishment of Magnitogorsk.

Communications.—Of the quarter of a million miles of inland waterway, 54,500 miles are navigable by steamers and another 110,000 miles by rafts. Fig. 149A shows the navigable waterways with the existing and projected canals. By way of contrast the total length of railways, including Asiatic Russia, is about 48,000 (compare Great Britain alone, 20,000 miles). It is planned to increase this to 56,000 miles by 1937. The Russian railways are for the most part of broader gauge than those of the rest of Europe. So trains cannot run direct from Russia to Western Europe. The breaks of gauge on the two main lines are at Riga and Warsaw. Civil aviation has made rapid strides in the U.S.S.R. Many thousands of miles of regular routes are operated; in winter the planes are furnished with skis, which enable them to alight on and take off from snow surfaces.

Internal Trade and Industries.—Before the Great War the Russian Empire, next in order of size to the British Empire, com-

prised one-seventh of all the land of the globe. After the Bolshevik Revolution of 1917 the new independent republics of Finland, Estonia, Latvia, Lithuania, and most of Poland were carved out of the fringes of Russia. But the remainder now constitutes the Union of Socialist Soviet Republics, of which the largest, or Russia proper, is the R.S.F.S.R. (Russian Socialist Federal Soviet Republic).

In a soviet republic all private property in land is abolished, all land being the common property of the people. All forests, mines, waters, and livestock are national property; the State owns all factories, railways, and buildings.

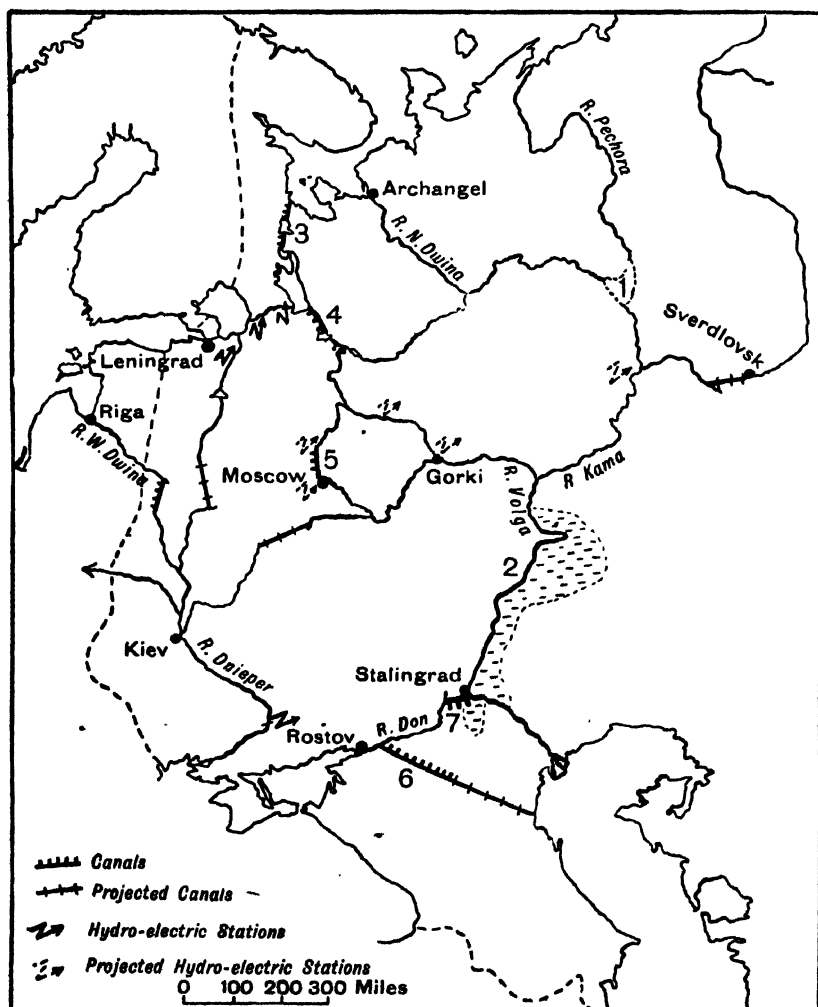


FIG. 520F.—Waterways of European Russia.

Notice the important new White Sea Canal (3).

With such absolute control, the State has set out to convert Russia from being in the main a primary producer to a self-sufficing secondary producer, and the first "Five Year Plan" (1928-32) aimed at industrializing the country in five years, so that it would be independent of foreign supplies of manufactures of all kinds.

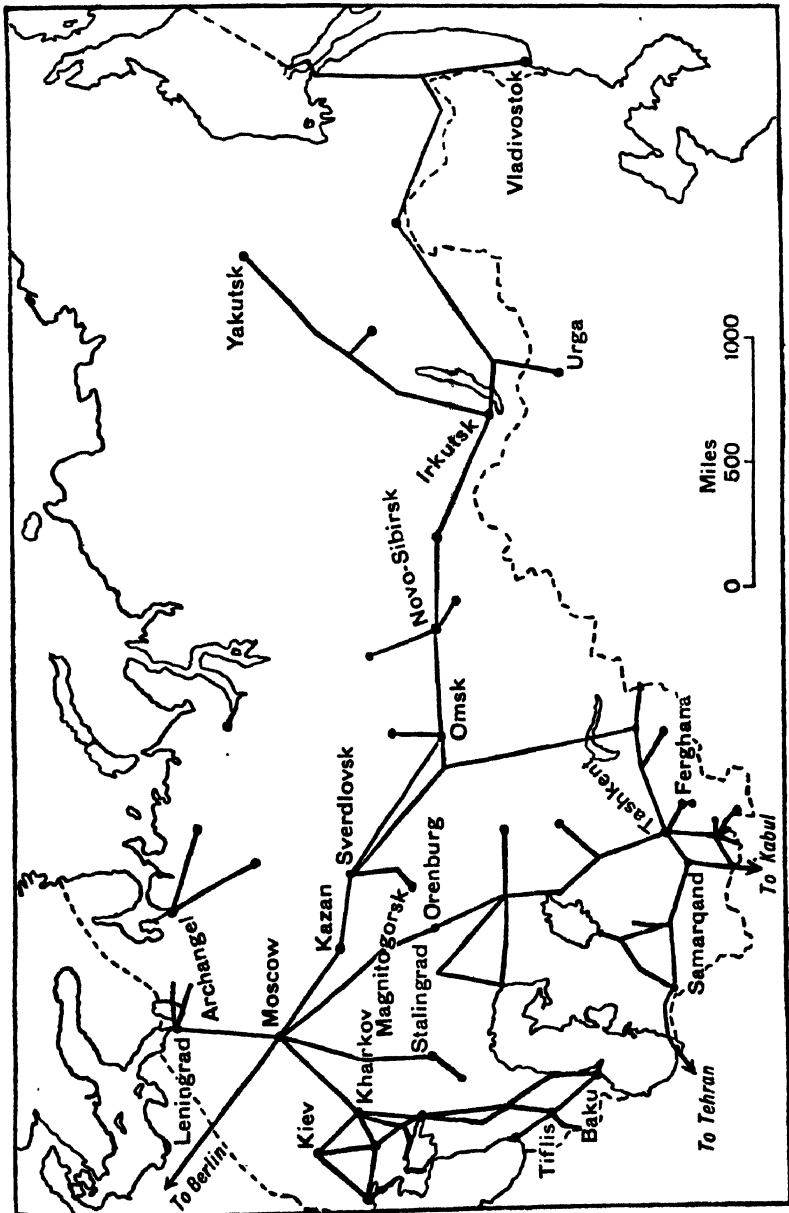


Fig. 520c.—The regular airways of U.S.S.R. in 1934 showing connections of European with Asiatic Russia.

One great result of these plans must of necessity be a new form of national consciousness: the realization by one section of the 166,000,000 people of the existence of the other sections. Concurrently must come the development of internal trade and communications. But money for development must come by sale abroad of primary products. Hence the recent great efforts to resuscitate foreign trade. Industrial production now exceeds agricultural in total value.

But Russia is a huge country. Before the revolution of October 1917 its needs in manufactured goods were served largely by two centres—St. Petersburg (Leningrad) and Moscow. Neither was well situated relative to raw materials—the former owed its importance to its being *the* port connecting Russia with Western Europe, the latter had to draw its coal from the Donetz Basin, its iron from Ukraine, and its cotton from Central Asia 2,000 miles away. Two other industrial centres were Ivanov and Nijni-Novgorod (now Gorky). It has been the object of the new régime, through the First and Second Five Year Plans (1928–32 and 1933–7), to secure a more even distribution of industry and one based more on the availability of power and raw materials and the presence of markets. By the end of 1932 the relative importance of the industrial regions, measured by the capital invested in them, was as follows :

1. Central Region (including Leningrad and the Moscow areas)	41	4. Transcaucasia	6
2. Ukraine	22	5. Volga Region	5
3. Urals and Kuznetzk Coalfield of Siberia	11	6. Central Asia	2
		7. Other Regions	13

We may now consider briefly each of the chief industrial regions.

Central Region—Leningrad.—Leningrad has the advantages of its position, but it is far removed from a coalfield; its site was formerly a swamp on the border of the almost uninhabited northern forests, far from sources of food and raw materials. The region is now served by the first of the Soviet hydro-electric power stations, as well as by others since constructed, and from stations using peat fuel. Leningrad is concerned with metal and metal-using industries (including now electrical machinery) and shipbuilding (especially of timber ships and icebreakers).

Central Region—Moscow.—The factories of the Moscow region formerly used coal from the Donetz Basin. Recently much more use has been made of the inferior brown coal of the Moscow Basin either directly or as electric power. The whole area, together with Gorky and Ivanov, is linked by an electric grid which is eventually to cover the whole of Russia. Moscow was pre-eminently the textile city and still produces half the cotton fabrics made in the

country, but it has now become a great machine producing centre and with a large heavy chemical industry. Its clothing industry is noteworthy.

Central Region—Ivanov.—This region is a close rival of Moscow in textiles, but both will decrease in relative importance as Central Asia and Siberia grow.

Central Region—Gorky.—Gorky is proud of its automobile works and other engineering works.

Ukraine.—The industry of Ukraine reflects two things—the abundance of iron ore and coal and the output and needs of a rich agricultural region. On the one hand comes the production of two-thirds of Russia's pig-iron. Formerly the coalfield did the smelting, receiving the iron ore from Krivoi Rog 300 miles away. Now there are works also near the iron mines. Russia's annual production of pig-iron exceeded 10,000,000 tons in 1934 (compare Britain 7,000,000 in 1925, before the great depression). It is claimed that the hydro-electric power station on the Dnieper is the most powerful in the world. With this reserve of power it is not surprising to find an extensive industrialization— with factories for tractors and agricultural implements at Kharkov and many southern points including Odessa and Rostov. The utilization of agricultural produce is seen in the numerous beet-sugar factories, flour mills, and canning factories.

Urals and Kuznetzk Coalfield.—Here the major difficulty lies in the occurrence of iron ore and metals in the Urals 1,200 miles from the coal of Kuznetzk. So industry has been developed by the Ural-Kuznetzk Combine operating at both ends. In the Urals the huge centre of Magnitogorsk has arisen, followed by Orsk further south and by the rebuilding of many works further north.

Transcaucasia.—The non-Russian countries of Armenia, Georgia, and Azerbaijan are cut off from Russia proper by the great rampart of the Caucasus Mountains. Across the mountains there is one motor road—the Georgian Military Highway—but no railway. The railways run round the western and eastern ends only. So Transcaucasia is still isolated, but instead of being neglected is being encouraged to develop its own industries. Some coal is available, abundant oil, and abundant water power. Minerals are at hand and timber from the forests; a local market requires textiles and clothing. Hence the varied industrial development around Tiflis, Erivan, and other centres.

Volga Region.—Here lie the new centre of Stalingrad and the older one of Saratov in the heart of the agricultural steppe lands and so concerned with supplying the needs of that region.

Minor Industrial Centres.—Amongst these may be noted particularly the Kola Peninsula in the far north and the numerous wood-working centres scattered over the north.

Production and Foreign Trade.—Russia has suffered very greatly from war, famine, and revolution. From 1917 to 1922 enormous numbers of people died from disease and starvation. Fig. 150 shows the variation in the export trade of Russia in recent years, and how it has suffered from the revolution. Formerly Russia occupied a very important place as a supplier of foodstuffs and raw



FIG. 520H.—The Industrial Regions of Russia.

materials. In the period 1909-13 Russia was the world's leading exporter of wheat, oats, barley, maize, timber, and flax, and ranked second in butter. During the war and revolution her place was taken by such countries as Canada, the United States, Argentina, Australia, and New Zealand. Whether Russia, despite her attempt to lower prices of exports such as timber by using forced labour, can ever

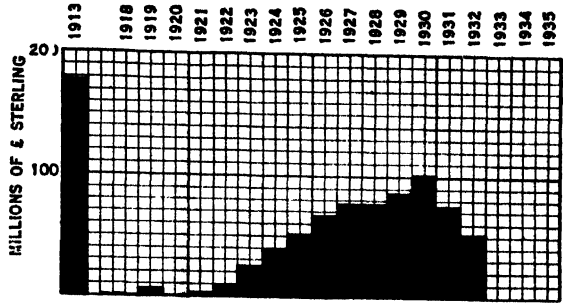


FIG. 520I.—The exports of Russia in recent years—value expressed at 1913 prices (approximate). 1933, 50 £mn; 1934, 42.

take her pre-war position remains to be seen. The main items entering into foreign trade are shown in Fig. 520J.

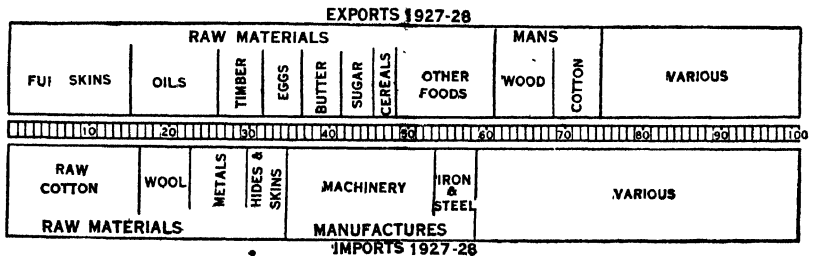


FIG. 520J.—The trade of U.S.S.R.

POLAND

The old kingdom of Poland has again become independent as a republic. It was once an important country of Europe, but before the Great War was occupied by Germany, Russia, and Austria-Hungary. Poland is an example of a state with few natural or geographical boundaries. It consists mainly of flat land, and fades eastwards into Russian territory, westwards into Germany. But the country is an ethnic unit, and the Poles are proud of their nationality, and are determined to secure prosperity for their country once more. Running through the centre is the great highway, the River Vistula, leading to the natural outlet of the country in the port of Danzig. But Danzig with its large German population has been made a free city, open to all nations equally.

Poland has an area of about 150,000 square miles and a population of 34,000,000. The whole of Poland has a climate continental

in character and the rivers are frozen for several months of the year. The country is divisible very roughly into two halves :

Northern Poland is the glaciated plain of the Lower Vistula and is mainly an agricultural country. Large areas are forested, and there are extensive districts occupied by useless marshes, especially near the eastern borders (Pripet Marshes) and western borders (Posen Marshes). Just as in the Baltic States, the climate is a little too severe for wheat, and again the principal crops are rye, oats, barley, and potatoes. A large quantity of sugar-beet is grown, also flax. There are seven million cows (one for every four inhabitants) and nearly as many pigs. The centre of this region is the capital, *Warszawa*, or Warsaw, on the Vistula. Warsaw is well placed in the centre of the country, just where the banks of the Vistula are higher and not liable to floods. It is a railway centre, and controls the routes between Germany and Russia. It has developed important iron, steel, leather, and textile industries. The natural outlet is down the Vistula, through Danzig, but Poland has built her own port at Gdynia. There are sugar factories and saw-mills in various parts of the plain.

Southern Poland comprises really several parts. The northern and largest is a low plateau covered by a fertile loess soil. Lodz (cotton manufactures) and Lublin are two centres in this part. Southwards is a trough (and an old routeway) parallel to the Carpathians and then the forest clad slopes of the Carpathians themselves. This southern belt was formerly known as Galicia. Lwow (Lemberg) is the centre in the east and near by are Poland's oil fields. Krakow is the centre for the west and near by are the famous salt mines. In the extreme south-west of Poland is a large part of the rich Silesian coal-field.

Trade of Poland.—Poland exports timber, wood-pulp and paper, coal, sugar, cereals, cotton goods, and mineral oil. A very large proportion of the trade is with Germany, but the timber is exported, *viâ* Danzig, largely to Great Britain. Raw cotton heads the list of imports, followed by machinery, apparel, raw wool, and wheaten flour.

GERMANY

Position and Size.—Since November 9th, 1918, Germany has been a republic. The present area of the country is 181,000 square miles with a population in 1933 of nearly 65,150,000. These figures do not include the Saar district with an area of 738 square miles and a population of 770,000. The European territory of the German Empire before the War was 27,250 square miles greater than at present, the principal losses being Alsace-Lorraine (5,600 square miles) to France and 17,800 square miles to Poland. The ceded territories had a population of about $6\frac{1}{2}$ millions. Even now

Germany is one of the largest and most populous countries in Europe outside Russia.

Physical Features.—Germany falls into two main divisions :

(a) The North German Plain, part of the great European Plain, covered by a thick mantle of glacial clays and sands.

(b) The Southern Highlands and Alpine Foreland, a varied complex of plateaus, hills, low mountains and valleys, occupying the southern half of the country and sloping, on the whole, northwards from the Alps.

Almost as fundamental as this division of Germany into two halves, a northern and a southern, is the division of the country

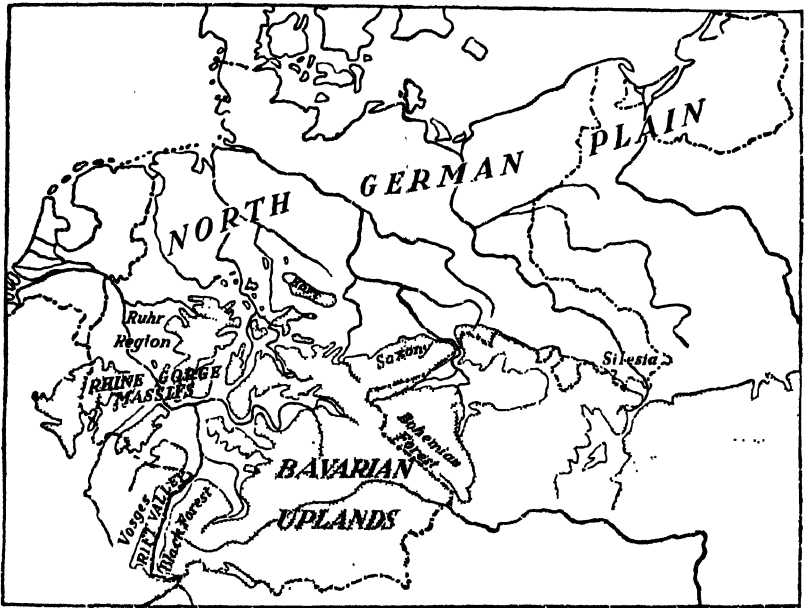


FIG. 521.—Germany.

into the great river basins. The four chief rivers all flow northwards or north-westwards: the Oder to the enclosed Baltic; the Elbe, Weser, and Rhine to the North Sea. Three of these—the exception being the Weser—rise outside Germany and flow right through the country. With the exception of parts of the north coast and East Prussia, nearly the whole of Germany lies in the basins of these four great rivers, and in each case the river forms the main artery of the basin through which it flows. The principal navigable rivers, and the canals by which they are joined, are shown in Fig. 192 (p. 244). It is unfortunate for Germany that the finest of her rivers, the Rhine, enters the sea through Holland.

Geology and Minerals.—The solid rocks which must make

up the floor of the North German Plain but rarely emerge from beneath the thick mantle of glacial deposits, and hence it is the latter which determine the character of the surface. As in the Baltic lands and Poland, the soil afforded is not naturally fertile; ridges of coarse sand which mark stages in the retreat of the ice sheet and which, incidentally, with a N.W.-S.E. trend, have influenced the direction of the German rivers to a marked degree alternate with water-logged tracts overlying the areas of clay.

Southern Germany is, geologically speaking, a complex area. The plateau regions are built up of sedimentary rocks, the more rugged areas either of masses of old rocks (Vosges, Black Forest, Thuringian Forest, Ore Mountains or Erz Gebirge, Harz Mountains, and the massifs on either side of the Rhine gorge) or of volcanic masses of comparatively recent date (the Eifel, Vogelsberg, etc.). Geologically and geographically the rift valley of the Upper Rhine is an interesting and remarkable area. Economically the coal fields are the most important parts of South Germany, but the density of population is high on many parts of the plateau owing to the fertile soil, sheltered valleys, and minerals.

Mining industries employ about 800,000 persons in Germany, and among European countries Germany ranks after the United Kingdom in value of her mineral production: the principal minerals are coal, lignite, iron ore, zinc, lead, and copper ores, rock salt and potash salts.

Coal.—The output of coal in Germany has increased very rapidly since the War (119 million metric tons in 1924; 154 in 1927).¹ More than 90 per cent. of the coal is raised in Prussia (in the coal fields of the Ruhr, Rhineland and Westphalia; Upper Silesia, and the smaller field of Lower Silesia). The important Saar field is at present administered by France. There is a production of about 4,000,000 tons from Saxony.

Lignite.—Lignite, or brown coal, assumes a much greater importance in Germany than in most countries of the world. The production in 1925-32 was nearly 140,000,000 metric tons (127 in 1933). According to German practice, 9 tons of lignite are considered equivalent to 2 tons of bituminous coal, so that Germany's output of lignite is equivalent to 31,000,000 tons of coal. The lignite fields lie mainly in Saxony and Prussian Saxony, the Thuringian states, and on either side of the Rhine above Cologne. The value of the lignite has been greatly enhanced by using it on the spot for the development of electrical power. Mineral oil (of which Germany has naturally only small quantities, in Hanover) is also obtained from lignite.

Iron Ore.—Having lost the great Lorraine fields, Germany's principal home supplies of iron ore are the Siegerland deposits in

¹ 143 in 1930; 119 in 1931; 105 in 1932; 110 in 1933.

the valley of the Sieg, a tributary of the Rhine. These ores have a high iron content and are rich in manganese. They are smelted in the Ruhr. Even before the War, the Ruhr iron industry, through using Lorraine ores, was becoming more and more dependent on supplies imported from Sweden and Spain. Other iron ore deposits are mined in Silesia and near Hanover.

Zinc and Lead are obtained in Silesia and in the Rhine Province near Aachen. The chief Silesian deposits are now in Poland and some of the Rhine deposits lay in the strip of territory transferred to Belgium. Copper is produced chiefly in the Harz, at Mansfeld. The deposits of the Ore Mountains (Erz Gebirge) are much less important than formerly.

Salts.—The chief salt-producing district in Germany is in the Prussian province of Saxony. The potash salts of Stassfurt in this region which overlie a bed of pure rock salt are very important and have made Stassfurt one of the leading seats of chemical industries in the world.

Climate.—The climate of Germany is intermediate in character between the oceanic climate of North-West Europe and the continental climate of Poland and Russia. The bulk of the country lies in the region of the "Central European type." Broadly speaking, as one goes from west to east the winters become colder and the summers warmer. In Southern Germany, aspect is important and many of the valleys, including the Rhine Rift, have comparatively mild winters, permitting the cultivation of the vine.

Vegetation.—The higher hills and mountains are clothed with valuable coniferous forests, and forestry in Germany is an industry of great importance, conducted under the care of the State on scientific lines. The 1927 forest area was 31.6 million acres, of which 22.5 million were coniferous and 9.1 million oak, birch, ash, beech, etc.

Agriculture.—Of the present extent of Germany arable land covers $51\frac{1}{2}$ million acres, or rather under 45 per cent.; pasture and meadow land 20 million acres, or 17 per cent. Hay, rye, oats, potatoes, wheat, barley, and sugar-beet are the chief crops.

Hay Crops cover nearly a third of the arable land.

Rye is by far the most important cereal crop and occupies nearly a quarter of the cultivated land—more than the combined acreage under wheat and barley. This is, in large measure, an indication of the poverty of the soil in Northern Germany.

Oats are extensively and widely grown, but *wheat* and *barley* are mainly crops of Southern Germany. The average yield is lower than in the United Kingdom.

Potatoes are important in Germany as a source of industrial alcohol. This accounts for the fact that they occupy ten times the acreage in Germany that they do in the United Kingdom.

Sugar-beet is a crop of the greatest importance, especially in central Germany around Magdeburg, and Germany is the premier beet-sugar producer in the world. The production of sugar was 1.6 million tons in 1925-32; 1.06 million tons in 1932-33. Other crops not mentioned above include hops (especially in Bavaria), tobacco (about 30,000 acres, yielding over 50,000,000 lbs. in 1933), the vine and fruits.

Domestic Animals.—Germany has nearly 19,000,000 cattle, or more than double the number in the United Kingdom. By way of contrast, there are less than 4,000,000 sheep but over 23,000,000 pigs, and 2,500,000 goats (1931). The numbers of horses are decreasing as in other parts of the world.

Fisheries.—Germany shares to a considerable extent in the North Sea fisheries, the catch in 1933 totalling 302,000 metric tons against 37,000 from the Baltic fisheries.

Population.—Out of her total population of 65.1 millions the bulk are classed as urban, and in this respect Germany bears comparison with Great Britain. Berlin has over 4 million inhabitants, Hamburg over 1 million (compare Greater London with 7.8 millions and Liverpool with Birkenhead over 1 million). There are no less than 44 other towns with over 100,000 inhabitants and 216 others between 20,000 and 100,000. There is the marked concentration on the coal fields as in Britain, but again the metropolis lies away from any coal field.

Manufactures.—Industrial establishments employ no less than 12½ million actual workers, thus indicating that Germany is now predominantly a manufacturing country, though the great development of the country did not begin until the seventies of last century when the federation of the German States and the receipt of an indemnity of £200,000,000 from France after the Franco-Prussian War afforded the necessary stimulus.

Iron and Steel.—The chief seats of the German iron production are the Ruhr, the Saar, and Upper Silesia; to a smaller extent in Bavaria, Hanover, and Saxony. Remarkable progress has been made in engineering and shipbuilding industries—the latter at Stettin, Hamburg, Kiel, Lübeck, and Rostock.

Textiles.—The textile industries give employment to two million people, and the clothing industries to rather more. The various branches of the textile industry are much more widely distributed and less localized than in the United Kingdom. Thus Barmen and Elberfeld on the Ruhr coal field carry on all branches of the textile industry, Chemnitz is the "Saxon Manchester," but also manufactures other textiles than cotton as well as machinery. The great German cotton market and place of import of raw cotton is Bremen on the Weser.

Chemicals and Electrical Apparatus.—The advanced state of

technical education in Germany was largely responsible for the pre-eminence attained in these characteristically German industries—a pre-eminence still largely maintained.

Sugar-refining and Brewing are two industries connected with German agriculture. Other industries will be noted later in connection with the regions in which they are developed.

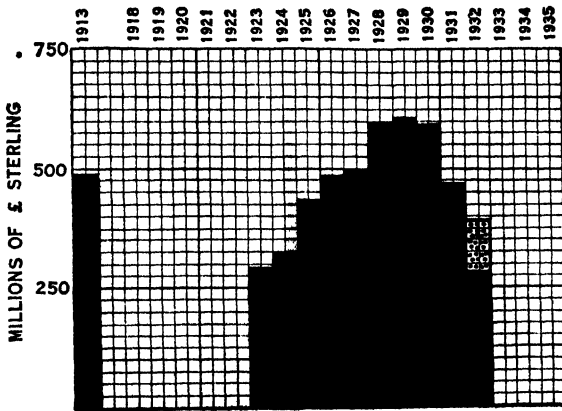


FIG. 522.—The exports of Germany (excluding gold and silver).

Communications.—Mention has been made in Part I of the importance of German waterways—nearly 6,000 miles of rivers or canalized rivers, and nearly 1,400 miles of canals. In 1933 over 78,000,000 tons of merchandize were carried on the inland waterways, compared with 365,000,000 tons carried on the rail-

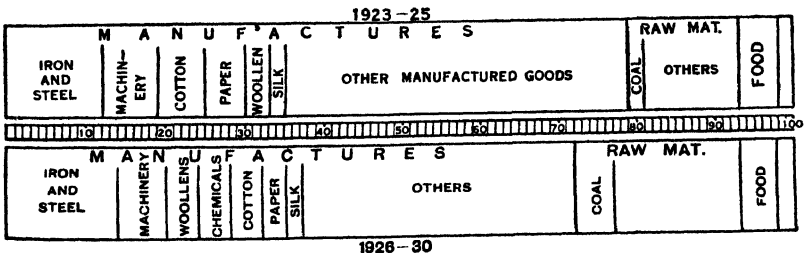


FIG. 523.—The exports of Germany.

Some of the iron and steel should, strictly speaking, be included under raw materials. The bulk of the "food" exported is beet sugar.

This is an interesting contrast with the state of affairs in Great Britain. Germany has 36,000 miles of railways.

Ports—The marked division of Germany into four great river basins has already been noted. Each river basin has one or more great ports serving as its outlet. Hamburg is the greatest of them all, and serves primarily the Elbe basin, including Saxony and also a large part of Czechoslovakia. Bremen serves the Weser Basin, Stettin (to a less extent) the Oder Basin. An attempt has been

made, by constructing the Ems-Dortmund Canal, to make Emden the great port of the Rhine Basin, but the bulk of the foreign trade of the Rhine Basin still flows through Holland *via* the ports of Amsterdam and Rotterdam, and to a less extent *via* the Belgian port of Antwerp.

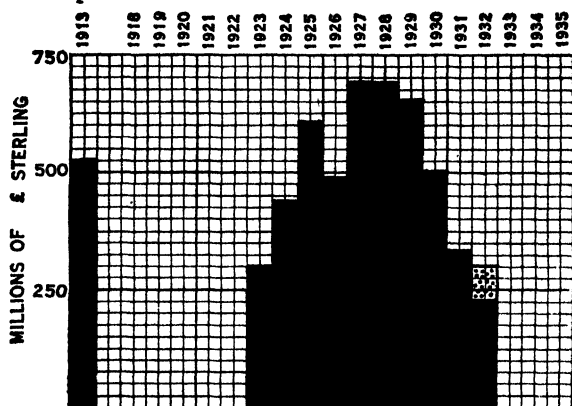


Fig. 524.—The imports of Germany (excluding gold and silver).

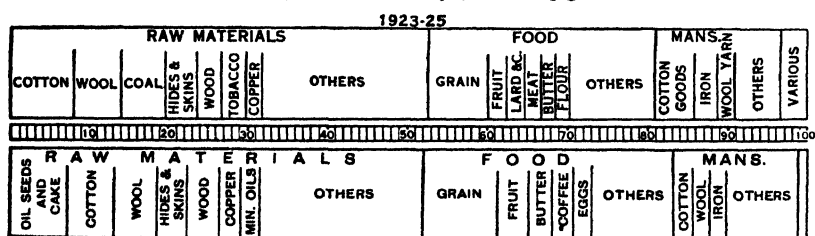


Fig. 525.—The imports of Germany.

Note, butter = butter and margarine.

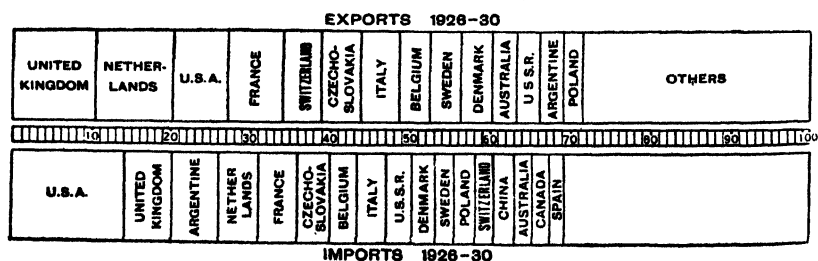


Fig. 526.—The direction of German foreign trade.

Foreign Trade.—The predominance of raw materials and food-stuffs amongst the imports is immediately noteworthy; and of manufactured goods among the exports. Sugar accounts, as shown in Fig. 523, for a considerable proportion of the "food-stuffs" exported. In Figs. 522 and 524 the solid black for 1932 represents value in £ at par of exchange, dotted at actual rate of exchange; 1933 figures were much lower.

THE NATURAL REGIONS OF GERMANY

The marked difference between the Great Plain of Northern Germany and the highlands of Southern Germany is easily recognized, but the division of the latter into natural regions presents some difficulty, and may perhaps best be made on a basis of river basins, or by separating first of all the coal fields and industrial regions. The scheme given below is an outline scheme only.

The North German Plain is essentially an agricultural region. In many places the soil is dry and sandy, especially along the forested ridges (the Baltic Heights) which border the Baltic Sea, but has been carefully cultivated; in other places marshes and bogs have been drained, so that now more than half the plain is cultivated, a quarter used for cattle-grazing, and most of the remainder is woodland. The most important grain is rye, next comes oats, but wheat will only grow in a few places where the soil is richer. Large areas are used for potatoes (from which alcohol is made) and sugar-beet. Germany produces more beet sugar than any other country.

Agriculturally the richest tracts are along the southern border of the plain, where it commences to fade into the hills of Saxony or into the Silesian Basin, where rye gives place to wheat, and where are the foci of sugar-beet cultivation.

Berlin, the capital of Germany, lies in the heart of this region; from it all parts are easily reached by rail. On the Baltic Sea are the ports of *Königsberg*, serving East Prussia; *Stettin*, engaged in shipbuilding; *Lübeck* and *Kiel*, the latter at the Baltic end of the Kiel Canal. The Baltic seaports suffer by being blocked by ice in winter. Generally speaking, the Baltic coast of Germany is a shallow shelving coast, and the large lagoons, called *haffs*, by which it is fringed, are usually too shallow to be used by large vessels. It is the short length of North Sea coast which is of primary importance to Germany and emphasizes the significance of *Hamburg*. By far the largest port of Germany, Hamburg is more than the outlet of the Elbe basin, which it primarily serves. *Bremen*, on the other hand, is mainly the outlet of the Weser Basin, including Hanover. The significance of *Emden* and the Ems-Dortmund Canal has already been emphasized.

Apart from Berlin, the large inland centres of the North German Plain are nearly all situated along the richer agricultural southern margins—Hanover, Magdeburg, Leipzig, and Breslau.

The Rhenish-Westphalian Industrial Region, including the Ruhr coal field. The great industrial region of the Lower Rhine has a detached area around Aachen (Aix-la-Chapelle) where the extremity of the great coal field of Belgium lies in German territory, but the main part of the region lies along the banks of the Rhine from Cologne to Ruhrort and on the great Ruhr coal

field. Iron and steel may be regarded as the basic industry of the region, and is carried on especially at Essen, along the narrow valley (the Enneperstrasse) between Barmen and Hagen, at Dortmund, Dusseldorf, and Duisburg. Remscheid and Solingen are the centres for cutlery steels. The textile industries are concentrated at Barmen and Elberfeld (woollens, silks, etc.), Crefeld (silks and

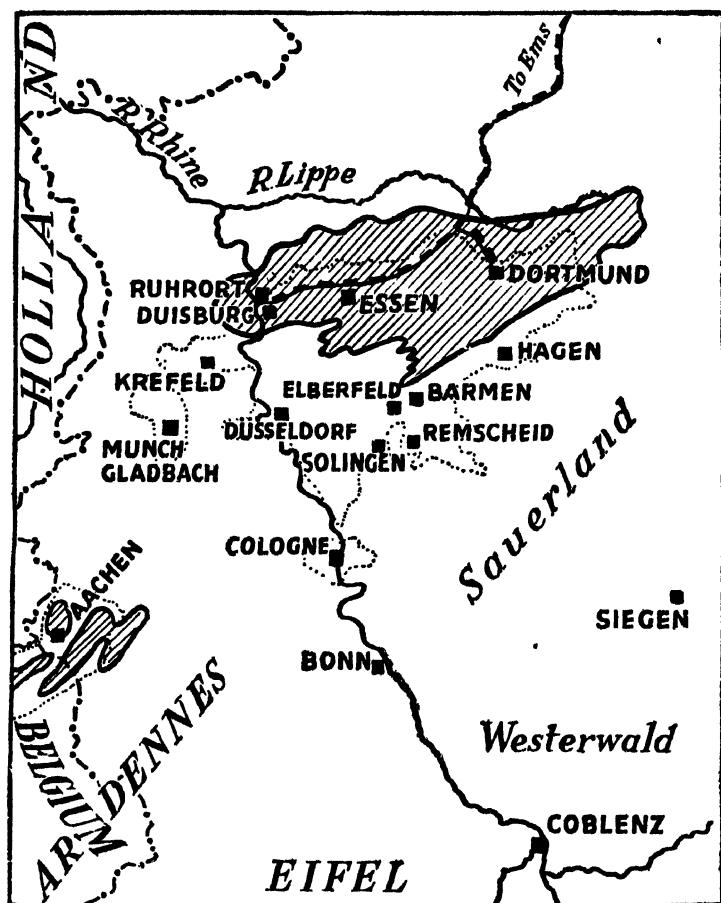


FIG. 527.—The industrial regions of the Lower Rhine.

The lined areas are the coal fields; the approximate limits of the industrial regions are marked by a dotted line.

velvets), Aachen (woollens), Dusseldorf, Munch Gladbach (linen, cotton, woollens), Duisburg, at the junction of the Ruhr and Rhine, carries on shipbuilding, but the great river town is the bridge town of Cologne engaged in a great variety of manufactures, including textiles, machinery, scent, cocoa and chocolate.

The Rhine Gorge Massifs.—Between Mainz and Bonn the

Rhine flows through its famous gorge, with mountainous massifs of old rocks flanking it on either side. On the west are the Hunsrück and the Eifel—separated by the valley of the Moselle—on the east over the Taunus, Westerwald and Sauerland. In the valley of the Sieg lie the iron ore deposits of Siegen. The mountains are largely forested, but in the sheltered Moselle valley, as well as in the Rhine valley itself, the vine flourishes. Coblenz is a large town at the junction of the Moselle and Rhine.

The Rift Valley of the Rhine.—Between the Swiss frontier and Mainz, the Rhine flows through a broad, fertile valley forming a rich agricultural region where barley, wheat, tobacco, the vine and fruits are leading crops. West of the Rhine, part of this plain lies in France; east of the Rhine its limits are sharply defined by the heights of the Black Forest. With this region may be grouped the fertile lower valleys of the Neckar and Main. Industrial centres have grown up at Frankfurt (machinery, chemicals, brewing); Mainz (leather, machinery); and Ludwigshafen-Mannheim is an important distributing centre at the junction of the Neckar and Rhine.

The Bavarian Uplands.—With the exception of the Rhine valley the whole of south-western Germany is occupied by a great stretch of upland, nearly all over 1,000 feet above sea-level, lying between the Black Forest on the west and the Bohemian Forest on the east, and extending from the Alpine foreland on the south to the Thuringian Forest, the Harz and the Rhine massifs, already mentioned, on the north. Naturally, this large area varies greatly. The hillier parts are usually clothed with valuable coniferous forest, interrupted in some areas by hill pastures supporting numbers of sheep, and along the Alpine foreland by an extensive dairying tract. The less rugged parts have good soils and enjoy a better rainfall than is found in Northern Germany, with the result that barley, oats, and wheat are grown in large quantities. The sheltered valleys are the richest regions; those of the Neckar, Main, and Upper Danube deserve special mention. Munich is celebrated for its beer, but both Munich and Nürnberg are examples of towns not well situated in relation to coal, raw materials, or communications, which have developed important industries in the manufacture of small articles requiring little raw material—toys, pencils, electrical apparatus, instruments. It is obvious that the development of the first two has been influenced by the local supplies of suitable wood; the economic factor is evidenced in the manufacture of metal toys which followed that of wooden toys. Stuttgart, the chief town of the Neckar Valley, manufactures hosiery and cotton goods, and has a large printing trade.

The Franconia Jura, which run obliquely across the great upland tract, are sometimes separated as a distinct region.

The Harz Mountains and Surrounding Region.—The Harz Mountains are forested, but the low hills of Brunswick and Hanover by which they are flanked on the north form a rich agricultural area in which sugar-beet, wheat, and fruit are particularly important, and which has already been noted as lying on the southern side of the great German plain.

The Saxony Industrial Region.—Primarily Saxony is a rich agricultural region with sugar-beet, wheat, barley, rye, oats, and potatoes as leading crops and belonging to the rich agricultural belt which flanks the great German plain on the south. The presence of basins of bituminous coal around Zwickau, Chemnitz, and near Dresden, and of lignite in several basins further north has, however, been largely responsible for the industrialization of much of the region. The textile industry was favoured at an early date by the supplies of wool from the sheep pastures on the slopes of the Erz Gebirge; the minerals (not now of great importance in the Erz Gebirge) and forests of the mountains afforded other supplies of raw materials. Woollen manufactures are still carried on, but Saxony has become the great seat of cotton-working in Germany, with Chemnitz and Zwickau as the leading centres. The famous Dresden china is actually made now at Meissen, Dresden being concerned rather with machinery. In the north of Saxony, on the borders of the plain, lies Leipzig, a famous old centre of trade (symbolized by the Leipzig Fair) and learning (symbolized by its printing and publishing trade).

The Silesian Industrial Region.—Two-thirds of the great upper Silesian coal field now lies in Poland, and Germany has lost the great centres of Königshutte and Kattowitz, but retains Beuthen Gleiwitz, and Ratibor. The first two are iron and steel towns, the last manufactures paper. Apart from the manufacturing region, Silesia is a rich agricultural and dairying region, belonging again to the rich belt which flanks the German plain on its southern side.

DENMARK

Denmark is a very small country, with an area of 16,600 square miles and a population of 3,550,000. It consists of the low peninsula of Jutland and a group of islands in the Baltic Sea. The whole land is very flat, and there is no hill more than a few hundred feet high. Much of the western coastal tract is covered by sand dunes thrown up by the sea and there is a considerable proportion of waste land. Forests have been planted to prevent the sand from blowing inland. Although not naturally fertile, no less than three-quarters of the surface of Denmark are cultivated; the yield of crops is very high (sometimes the highest in Europe) and the quality good. Denmark is thus essentially an agricultural country and especially a dairying

country. There are nearly 3,000,000 cows, 5,450,000 pigs, and nearly 20,000,000 hens in the country (1931). The principal products are butter, cheese, bacon, and eggs. Although the country is so small and has no minerals (except limestone for cement and clay for porcelain) no coal, no water-power, and only a poor soil, it is rich and prosperous because of the care with which the people work the land. The success of its agriculture is undoubtedly due in a large measure to the high state of education of the farmers and to the co-operative system among them encouraged by the Government. There are many factories, but they are nearly all connected with agricultural products—there are factories for making butter and cheese, sugar from sugar-beet, beer from oats and barley, and for the manufacture of margarine. There are good fishing grounds on the shallow west coast, and young fish are hatched in the “Lim Fiord.” The fishing centre and west coast port is *Esbjerg*. The principal town and port is *Copenhagen*, with half a million people, controlling the narrow entrances to the Baltic Sea. Denmark has a well-organized system of railway communications, in which an essential part is played by the train ferries between the islands, and the islands and the mainland. The foreign trade of Denmark is considerable, having averaged at par rate of exchange over £200,000,000 in recent years. Butter alone represents one-third of the exports, bacon more than a quarter, eggs about 8 per cent.—in all the dairying industry represents three-quarters of the total export, and well over half goes to Great Britain. The imports are very varied in character, but it is noteworthy that cereals occupy but a small place, showing that Denmark is self-supporting in food-stuffs. The bulk of the imports come from Germany, the United Kingdom, and the United States.

The Faerøe Islands (“Sheep Islands”) belong to Denmark, as well as the great plateau of Greenland; Iceland is an independent kingdom, but shares its king with Denmark.

THE NETHERLANDS, OR HOLLAND

Holland, or the Kingdom of the Netherlands (Koninkrijk der Nederlanden) is a small country, only 12,603 square miles in area, but with a population (1931) of 7,920,000 or over 625 to the square mile.

Much of Holland consists of the combined delta of the Rhine and Meuse, together with a stretch of low coastland to the north and an area of slightly higher land on the east. The whole country may be described as flat, and it is only in the extreme south-east, where Holland abuts on the Ardennes massif, that there is a small tract of land over 300 feet. Holland may be divided roughly into two halves, a western and an eastern. In the western half the soils are alluvial, except for a strip of sand dunes along the actual North

Sea coast. Much of this part of the country is actually below sea-level and has been regained from the sea by centuries of labour. In addition there are large areas which, though above sea-level, lie so low that they cannot be drained by ordinary means. Hence "polders"—enclosures surrounded by dykes or embankments and provided with pumping machinery—are characteristic of much of this part of the country. The soil is rich and moist, well suited to the growth of the finest pasture grasses on which cattle and horses thrive. Agriculture flourishes, wheat being the important cereal crop, and the western part of Holland may be described as a densely populated, thriving, agricultural, dairying country. After discussing the project for many years, active steps are now being taken to drain the greater part of the Zuider Zee.

The eastern half, on the other hand, has a sandy soil of fluvio-glacial origin—the so-called "diluvial" soil—which is much less fertile. Large areas are covered with heathland interrupted by peat-bogs;

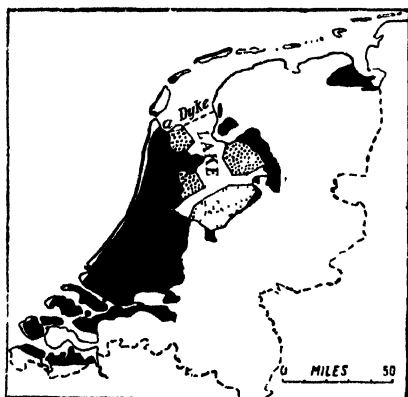


FIG. 528.—The reclamation of the Zuider Zee.

Dotted areas are the tracts to be reclaimed.
Existing land below sea-level shown in black.

where cultivated the principal food crop is rye in place of the wheat of the fertile west. In the south, on the borders of Belgium, lies the Campine or Limburg coal field, a comparatively new discovery and an important addition to the resources of Holland. In 1912 the production was only 1,700,000 metric tons; in 1931 it had increased to 12,900,000 tons.

Holland is thus mainly an agricultural country. The people grow rye, oats, wheat, barley, and potatoes for their own use; another important crop is sugar-beet, from which sugar is made both for home use and export. An interesting industry is flower-farming; large quantities of flower bulbs, such as tulips and narcissi, are grown and exported. Very important indeed is dairy-farming. The cattle, fed on the rich pastures of the polders, produce large quantities of excellent milk, from which butter and cheese are made. Holland has over 2 million cattle and 2 million pigs. Fishing is important, especially among the islands of the north, and Holland shares in the great herring fisheries of the North Sea. Large quantities of oysters are also produced.

In the Middle Ages Holland had a high reputation as a manufacturing country. In the last century the absence of coal was a

great hindrance to the development of manufacturing industries. Large quantities of coal were imported from Germany and Great Britain, and cotton, linen, and woollen industries carried on. It

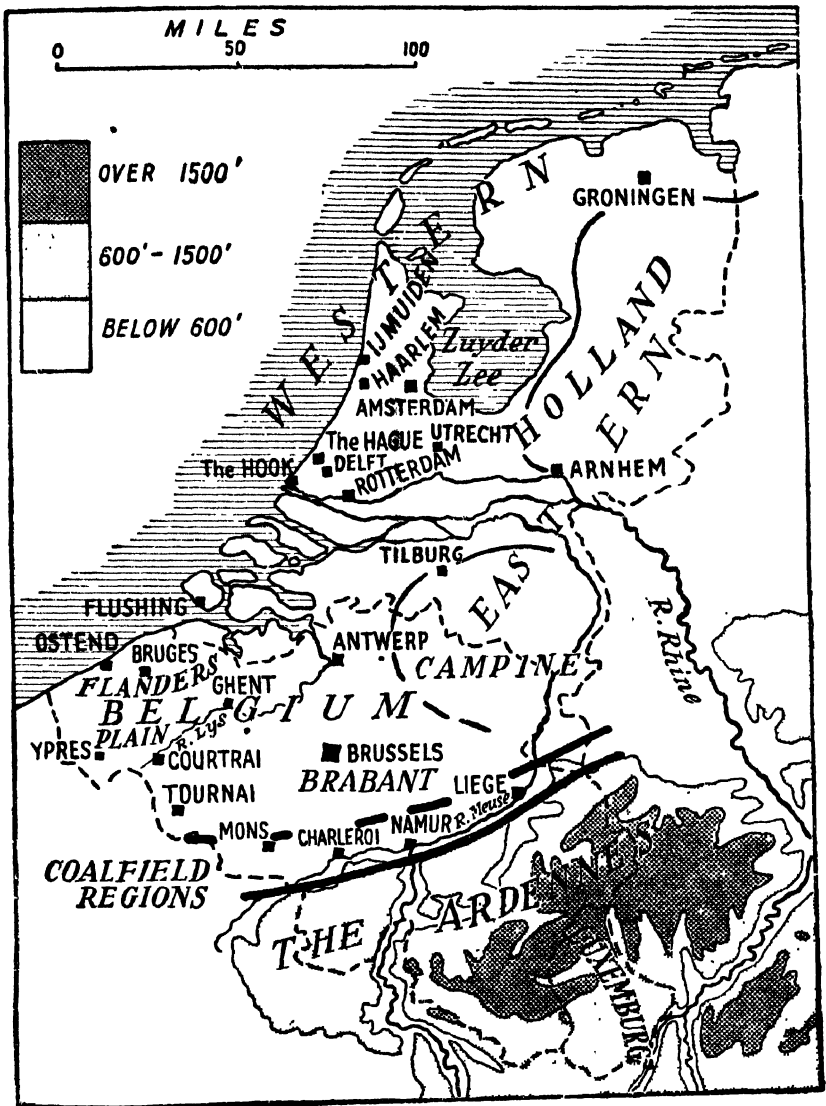


FIG. 529.—Belgium and Holland.

is interesting to note that several cotton and linen manufacturing towns in the country, Enschede, Almelo, Hengelo, etc., are situated in the province of Overijssel. The cotton industry was established

here, on poor agricultural land and in a thinly populated part of the country, at the end of the eighteenth century. The great market for cotton goods in the Dutch East Indies has been a great advantage to the industry.

Linen and other manufactures are carried on at *Tilburg* and *Utrecht*. *Delft* has long been famous for manufactures of earthenware. The Rhine, the greatest river of Germany, reaches the sea through Holland, and so it is not surprising that, although Holland has little coal and less iron, ship-building and ship-repairing are important occupations at the mouths of the Rhine and Meuse (or Maas). *Amsterdam* is the centre of the diamond-cutting industry. The two largest towns in Holland, *Amsterdam* and *Rotterdam*, are both ports. *Groningen* is the centre of the north-east of the country, and of a great butter-producing area. The capital of Holland is *The Hague* ('s-Gravenhage). The four university towns of Holland are *Leiden* (founded 1575), *Utrecht* (1636), *Groningen* (1614), and *Amsterdam* (1632). The country has long been famous for its art and learning. An industry widely distributed through Holland is the brewing of beer and the distilling of spirit (especially Hollands Gin, which is distilled from rye at *Rotterdam* and other centres). An important inland centre of trade is *Arnhem*. *Haarlem* is the centre for the bulb-farming industry.

In foreign commerce Holland has stood in the front rank of nations from the very beginning of its separate existence. Among the facilities for foreign commerce the waterways, natural and artificial, have greater importance in Holland than in any other European country. The length of navigable rivers and canals is roughly double that of railways; canals are more important than roads. The Dutch are bold and intrepid sailors, as their early voyages of discovery proved long ago. Although such a small country, Holland has the seventh largest merchant fleet in the world—over 2½ million tons.

During the last few years the imports into Holland have been valued at about £200,000,000 and the exports at £150,000,000. In addition there is a very large transit trade, for Holland forms the natural gateway to the whole of the Rhine Valley and the most important tracts of Germany.

The leading imports are textiles, cereals and flour, iron and steel, coal, wood, and oil seeds, followed by other raw materials of various kinds. Apart from the transit trade, a considerable proportion of the imports are not intended for home consumption, but it is impossible to separate them in the statistics available.

The exports in order of value are textiles, sugar, cheese, butter, meat, vegetable oils, margarine, and paper.

The greater part of the trade is with the nearby countries of Great Britain, Belgium, France, and Germany, but there

is a large trade also with the Dutch East Indies and the United States.

The leading seaports of Holland are Amsterdam and Rotterdam, and immense sums of money have been spent to make them suitable for modern traffic. *Amsterdam* is connected with the North Sea, near the harbour of IJmuiden, by a deep ship canal (the North Sea Canal). *Rotterdam*, although well situated on the combined mouth of the Rhine and Maas (Meuse), is liable to be obstructed by the sediment brought down by these rivers. A great canal, the New Waterway, now connects Rotterdam directly with the North Sea, and ocean-going vessels reach the town at all states of the tide. The port, too, has greatly benefited by recent improvements in the navigation of the Rhine, since it is the natural key to the Rhine Valley.

The minor ports of Holland are the Hook of Holland and Flushing (both for passenger and mail traffic with England), Schiedam, Harlingen, Dordrecht, and Groningen.

BELGIUM

The kingdom of Belgium has an area of 11,750 square miles and is thus smaller than either Holland or Denmark. The population numbers nearly 8,100,000 or an average density of about 688 (1930).

The country is divisible into three distinct portions :

(a) In the south the Ardennes form a plateau of hard rocks, partly covered with valuable pine forests and partly with sheep pastures. It is thinly peopled, but in the south, where the hills are lower, is part of the rich iron field of Luxembourg.

(b) On the north is a country of low hills, devoted to agriculture. Near the coast the land is flat. Important crops are rye, oats, wheat, potatoes, and sugar-beet, from which sugar is made, and, in the low-lying tracts, flax. Many cattle are also kept as well as pigs—over a million in each case. In the east is the dry sandy country of the Campine, covered mainly with useless heathland, but assuming now a new importance because of the underlying coal field.

(c) Between the agricultural country of the north and the Ardennes in the south, there is a long, narrow strip running right across the country from west to east, and occupied by a coal field. This is the great manufacturing region of Belgium. Iron ores are brought from the south (Luxembourg), and there are many iron and steel works ; zinc ore is obtained in the east, and is smelted near Liège. The chief coal towns are *Mons*,

Charleroi, *Namur*, and *Liège*. The production of coal in 1931 was 27,000,000 tons; the normal production of iron is between 3 and 4 million tons and of steel the same. There are glass works and chemical factories at *Charleroi*, and chemical and railway works at *Liège*. The woollen industry is centred at *Verviers*. This region is very thickly populated.

Belgium is, in the main, an industrial country and exports iron and steel bars, glass and glassware, cotton goods, flax, and yarn, sugar, and zinc, as well as billets of wood from the Ardennes. Another important export is cut diamonds; the raw material from the Belgian Congo and Angola being cut at *Antwerp*.

The leading imports are food (grain, etc.) and raw materials (wool, cotton, hides, oil seeds, etc.). Belgium's trade is mainly with her neighbours (Great Britain, France, Netherlands, and Germany), and with the United States. There is a large import of grain, etc., from Argentina.

The capital and largest city is *Brussels*, situated in a central position and well served by railways. *Antwerp* is the largest port, but can only be reached from the sea through Dutch waters. Like *Amsterdam* and *Rotterdam*, *Antwerp* has a large transit trade in goods passing into Germany and a great rivalry exists between the Dutch and Belgian ports.

Antwerp is connected by first-class waterways with the *Seine*, *Meuse*, and more indirectly with the *Rhine*. One of Belgium's ambitions is to see completed a first-class canal direct to the *Ruhr* district of Germany.

Coutrai, *Tournai*, and *Ghent* are centres of the flax industry. *Tournai* has risen to importance because the waters of the River *Lys* are especially suitable for "retting" the flax. In modern times cottons have to some extent replaced linens, and Belgium has a high reputation for the quality of her cotton manufactures. The coast of Belgium is continually being added to by the sea. Sand dunes are thrown up by the sea, and the marshland behind can be drained. *Ypres*, *Bruges*, and *Ghent* used to be ports, now they are far inland though *Ghent* has a ship canal. It follows that the existing ports, of which the largest is *Ostend*, suffer much from being steadily silted up. Many Belgian towns were destroyed during the Great War, but, by the energy of the people, the country has quickly recovered.

Belgium is well served by railways, and there are important waterways including the River *Meuse* and the *Sambre*.

Luxembourg is a tiny state south of Belgium ruled by a Grand Duchess. It has valuable iron ores, which it sends to Belgium for smelting. Luxembourg is united with Belgium for customs purposes, in an "economic union."

FRANCE

Position and Size.—With the exception of the Soviet Union, the Republic of France is now the largest country in Europe, a position occupied in 1914 by Austria-Hungary. The area is nearly 213,000 square miles, and the population (1931) nearly 42,000,000. The advantageous position of France is especially worthy of note. She has not only a long coast line along the Channel and the Atlantic, facing the North American continent, and thus sharing the advantages enjoyed by Great Britain for trans-Atlantic trade, but she has also an important length of coast line along the Mediterranean well situated for far Eastern trade. It may be argued that Spain also has these advantages, but whereas Spain is cut off from the rest of Europe by a great mountain barrier, France adjoins on her eastern frontier some of the most populous and prosperous countries of Europe—Belgium, Germany, Switzerland, and Italy.

Physical Features.—The west, north-west, and north of France—more than half the whole country—belong to the great European plain, and in many ways are comparable with the south-west, south, and south-east of England. The central plateau or “massif central” forms a very well-marked unit—a plateau with a high south-eastern and eastern edge forming the Cevennes. The surface slopes gently westwards and north-westwards, hence the main drainage is in these directions. The south-east of France is occupied by the Alps, which reach the coast in the Maritime Alps to form the beautiful Riviera coast. It is not always realized what a large proportion of the Alps actually lies in French territory. Between the Alps and the Cevennes lies the fertile Rhone Valley; between the Cevennes and the Mediterranean are tracts of lowland which form part of the Mediterranean region. Along the southern borders of France lie the Pyrenees; in the east of the country are the Vosges, separating the northern plainland from the rift valley of the Rhine.

The great rivers of France are important as navigable highways. One only drains to the Mediterranean—the Rhone—two to the Bay of Biscay—the Garonne and the Loire—whilst the Seine is the most important river flowing into the English Channel. France is now one of the riverine nations of the Rhine and a considerable tract of north-eastern France drains into its tributary the Meuse.

Geology and Minerals.—The geology of France is reflected to a remarkable degree in the topography. The Central Massif consists of an old stable block of crystalline rocks surrounded by a ring of limestone. Particular economic interest attaches to the small folds of coal-bearing Carboniferous and Permian strata which are pinched in amongst the older rocks and also to the areas of late volcanic rock which cover parts of the surface, especially in the

Puy de Dôme district. The great fold range of the Pyrenees has a core of ancient crystalline rocks. The same is true, of course, of the Alps, but in the Alpine folds so well known in the Maritime Alps of France and the Riviera massive limestones predominate. The lowlands of the west and north of France fall geologically into three distinct parts. In the north-west is the Armorican massif of old rocks—sometimes called the Brittany massif, though it extends beyond the confines of Brittany—broadly comparable with the massifs of Cornubia and North Wales in England. Between the Armorican mass, the Central Plateau and the Pyrenees lies a broad basin of young sedimentary rocks—the Aquitaine Basin. Occupying the whole of the north of France is the Paris Basin, using that term in the widest sense. On the Belgian borders the Ardennes massif extends into France, whilst the great Belgian coal field is continued through France, under a cover of chalk and other rocks, to the shores of the Strait of Dover. Eastern France has the Jurassic iron ores of Lorraine, and includes a portion of the Rhine rift.

Broadly speaking, France is not richly endowed with minerals, but benefited from the restoration of Alsace-Lorraine which gave her the whole of the vast Lorraine iron ores and also the Alsatian potash deposits.

Mineral	Production—millions of metric tons	
	1925	1930
Coal	47.1	53.9
Lignite	1.0	1.1
Iron ore	35.8	48.5
Salt	1.3	1.7
Alsace potash products	1.2	0.5
Lead, zinc, silver ores	0.03	—
Gold ores	0.06	—

Coal.—France possesses but a single large coal-field region—that of the north of the country, which is an extension of the Belgian field. In reality there are several basins, but they occur approximately in a line and may be considered together. The fields suffer from intense folding and much of the coal is powdered, just as it is in the Belgian fields. This area produces three-quarters of the coal of France (1937). The only other fields in France are those already mentioned as lying amongst the old rocks of the Central Plateau. Those of St. Etienne, Le Creuzot, and Alais are the chief and have given rise to small industrial regions. France had also, until 1935, the Sarre (Saar) coal field, but this was restored to Germany as the result of a plebiscite. Its output in 1932 was

10,400,000 metric tons. France has insufficient coal for her requirements and is forced to import large quantities. Although the output is but small, special interest attaches to the mineral oil of Pechelbronn (Alsace), because the oil is obtained by mining the sands in which it occurs.

Iron Ore.—The one mineral of which France has large quantities is iron ore. Apart from small quantities from Normandy and near Creuzot and in the Pyrenees, nearly the whole output is from the great Lorraine field. The ore is low grade, and it was not until processes were perfected whereby the content of phosphoric acid could be eliminated that the deposits could be utilized. Much of the ore is smelted in the Briey Basin near the source of the raw material; but ore is also sent by water to the northern coal fields. France is handicapped in her iron and steel industry by the paucity of coal, and if she later loses the Sarre field the position will be far worse.

The Alsace Potash deposits occur a little to the north-west of Mulhouse, and are second in importance only to those of Prussian Saxony. The production reached 1,350,000 metric tons, yielding 230,000 tons of potash in 1922 and to a yield of 312,000 tons of potash in 1925.

Water Power.—The small reserves of coal in France have acted as a spur in the development of hydro-electric power. The principal developed and potential regions are the French Alps and the Pyrenees, the Cevennes form a subsidiary region. In 1934 4,000,000 horse-power was actually developed. It has been decided to electrify the whole of the French railway system and a considerable mileage—including the Midi Railway south of Bordeaux and part of the Paris-Orleans line—has already been done.

Climate.—In addition to the advantages already mentioned which accrue to France from her position between the Atlantic and the Mediterranean are those due to the consequent variations in climate and products dependent thereon. In the lowlands of the north and west the climate is of the North-western European type; warmest in the south-west, colder and more continental in the north-east. Owing to the elevation, the climate of the Central Plateau is characterized by colder winters and may be deemed of the Central European type—the same is true of the east of France. The lowlands round the Mediterranean have a typical Mediterranean climate but it is difficult to say how far up the Rhone Valley the type extends. Lyons may be taken roughly as the limit, but the cold winter winds which blow down the funnel-like Rhone Valley and are responsible for the turbulent Gulf of Lions—actually an unkindlier stretch of water than the famed Bay of Biscay—render the climate not typically Mediterranean.

The natural vegetation of France naturally varies widely with

the climate. Out of a total area of the country of 136,000,000 acres 24·7 million acres are under forest ; 11·8 million are moorland and uncultivated. The forests which thus cover 18 per cent. of France are a source of considerable national wealth, and are carefully controlled, and very large areas, especially south of Bordeaux on the "Landes," are actually plantations. Whilst much of the north and west is well wooded with deciduous trees, it is the pine forests of the higher land which are of the greatest importance. Some of the pine woods of the Mediterranean coast are valuable as sources of resin, which is obtained by tapping the trees in much the same way as rubber trees are tapped.

Agriculture.—Out of 89 million acres under crops, fallow and grass in 1928, the arable land accounts for 54·8 millions. The following table shows the principal crops :

Crop	Acreage (millions)		Yield (million metric tons)	
	1925	1934	1925	1934
Wheat	13·9	13·1	9·0	8·4
Rye	2·1	1·7	1·1	0·8
Barley	1·7	1·9	1·0	1·1
Oats	8·6	8·1	4·8	4·1
Potatoes	3·6	3·4	15·2	16·0
Sugar-beet	0·5	0·7	5·4	-
Vines	3·5	3·5	1,500 ¹	1,093 ¹

¹ Millions of gallons.

Wheat.—The importance of the French wheat crop is not always fully appreciated. France grows nearly a quarter of all the wheat produced in Europe outside Russia. Even so, the production is insufficient for home needs. Though wheat is widely grown for local markets throughout France, the Paris Basin is pre-eminently the wheat land of the country. The west tends to be somewhat too damp (compare Devon and Cornwall), the south-west is more suited to maize ; the soil of the Central Plateau is too poor.

Rye becomes the staple grain on the poor soils of the Central Plateau and the east.

Oats grow mainly in the north and west ; in the Mediterranean belt they almost disappear.

Maize, though not mentioned in the above table, is the great crop of the warm, damp south-west ; it is almost absent from the regions of summer drought, whilst the north, like the neighbouring parts of England, is too cold.

Root crops, including potatoes and sugar-beet, are of first importance, especially in the agricultural lands of the Paris Basin.

The Vine, as shown in Fig. 530, is widely cultivated in France

and is not restricted to the Mediterranean belt, which yields the largest production of unnamed *vin ordinaire*. Despite a total production averaging about 1,100,000,000 gallons, of which only between 14 and 15 million gallons (1931-34) are exported, France figures as a large importer of wine—300 to 400 million gallons average (1931-35). The localization of production of the better-known types of wine in France is important—the clarets around Bordeaux; many white wines in the lower Loire Basin; champagne on the dry chalk hills of the Champagne district in the east of the Paris Basin; and burgundies in the Côte d'Or.

Fruits of many kinds are widely grown—apples for cider in the north-west; various deciduous fruits in the Paris Basin. The olive is definitely restricted to the south-east, and, as usual, its distribution is really coincident with the Mediterranean type of climate.

Animals.—There were in France, at the end of 1933, nearly 3 million horses; 16 million cattle; 10 million sheep; 2.4 million goats; and 6.8 million pigs. Thus France has double the number of horses, cattle, and pigs found in Great Britain, but less than half the number of sheep.

Cattle are especially numerous in the wet north-west (the Armorican Massif) where butter-making is a very important industry; they are also numerous all over the north, in the Rhine country, among the Alpine pastures and on the northern borders of the Central Massif. In all these areas cheese and butter making are carried on, cheese becoming markedly more prominent in the south as butter is in the north. Cattle are very few in the Mediterranean region.

Sheep are most numerous on the Central Massif and on the dry chalk hills around the Paris Basin.

Sericulture is important in France, but is practically restricted to the Rhone Valley south of Lyons and adjoining regions.

Fisheries.—France, like Spain, enjoys the advantage of fisheries in the Atlantic and the Mediterranean. The industry employs 140,000 and the value of the catch approaches £13,000,000 (1934). The two great fishing grounds are off the coasts of the north-west (pilchards, sardines, etc.), and in the Mediterranean (tunny).

Manufactures.—One consequence of the wide dispersal of the French coal fields is the fact that the localization of the great

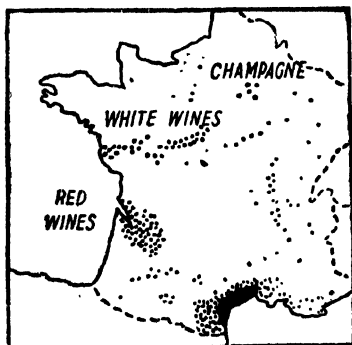


FIG. 530.—The vineyards of France.

Notice that most vineyards are found in the Mediterranean region. The northern coast is too cold for the vine and so in the central plateau.

manufacturing industries is governed more by the position of local supplies of raw material and the conveniences of obtaining supplies from abroad and marketing the product than by the supply of fuel.

The *iron* industry grew up at Creuzot, but great centres are now on the Lorraine iron fields (Briey Basin) and the northern coal field. Of the important *textile* manufactures, silk is concentrated in the Rhone Valley, where it was originally dependent on local supplies of raw material, and is carried on at Lyons, St. Etienne, Avignon, and Nîmes; cottons are very important in Alsace (especially Mulhouse), and in the towns of the Vosges, as well as on the northern coal fields (Lille, Roubaix, etc.), and at Rouen. Woollens are concentrated in the north, where are the principal supplies of native wool and where lie the ports of Havre, Rouen, and Dunkirk, importing Plate wool. Paris, like London, is associated with a wide variety of manufactures, but particularly with luxury goods and clothing. Among other French manufactures may be mentioned porcelain, earthenware (Paris, Limoges), glass (northern coal field), and watches (French Jura).

Communications.—A distinctive feature of the internal communications of France is the extensive use made of waterways. The principal canals and navigable rivers are shown in Fig. 191, on p. 243, and it should be added that a large network of canals exists in the north and north-east, so that most of the large towns, such as Metz, Nancy, Sedan, Arras, Lille, etc., are in direct communication by first-class waterways (at least 6½ feet deep) with the great ports of Dunkirk and Antwerp. The extensive French railway system centres on Paris.

Ports.—France has about half a dozen great ports. Marseilles occupies the leading position, since it has nearly all the Mediterranean and far Eastern trade, and benefited enormously by the opening of the Suez Canal. It has recently been connected with the Rhone by a deep-water canal. Its local industries, such as the refining of oil and the making of soap, dependent originally on the local supply of olive oil, have expanded very largely. Havre and Rouen share much of the American trade of France (importing cotton, wheat, wool, coffee, etc.), and are the ports of Paris, but have a great rival in Dunkirk. The latter has risen rapidly; being conveniently situated for the northern coal field, it imports the raw material required by the manufacturing towns of that area—notably wool—and exports their finished products. Bordeaux is the wine-exporting port; Cherbourg occupies the same position as Southampton does in England, as a port of call for trans-Atlantic liners; La Rochelle and Nantes with their outports conclude the list of large French ports.

Foreign Trade.—More than four-fifths of the exports of France are manufactured goods; more than four-fifths of the

imports are foodstuffs and raw materials. The unique feature of the export trade is the high value of wearing apparel; the large import of coal emphasizes one of the great weaknesses of France's general position.

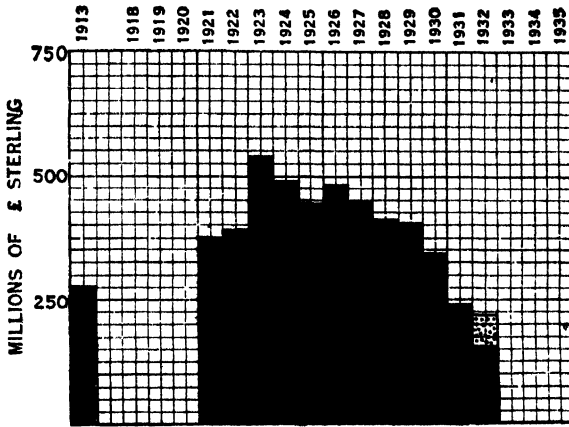


FIG. 531.—The exports of France, converted into sterling at rate of exchange current for each year.

Francs were stabilized at Fr. 124.21 = £ gold. Stated in francs, the trade shows a steady rise to 1928.

1913	6.0 billions.	1925	45.4 billions.	1930	42.8 billions.
1921	19.8	1926	59.7	1931	30.1
1922	21.4	1927	55.2	1932	19.7
1923	30.9	1928	56.0	1933	18.4
1924	41.5	1929	52.0	1934	17.8

Tonnage shows a steady and continuous rise 1921-1929.

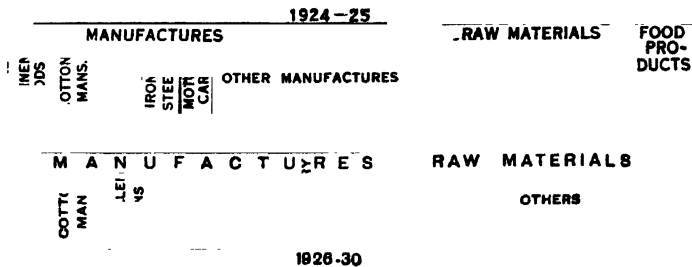


FIG. 532.—The exports of France.

The principal items included under the category of "food" are wine, fruits, and sugar. Raw materials include some iron, ores, hides and skins, and wool.

NATURAL REGIONS OF FRANCE

Northern France.—Northern France corresponds broadly with the Paris Basin, used in its widest sense. It does, however, include also (1) a small fragment around the great port of Dunkirk of the maritime plain of Flanders described under Belgium; (2) a fragment of the old massif of the Ardennes, also described under

Belgium; and in the east (3) portions of the massifs bordering the Rhine. Eliminating these border tracts, the Paris Basin may be

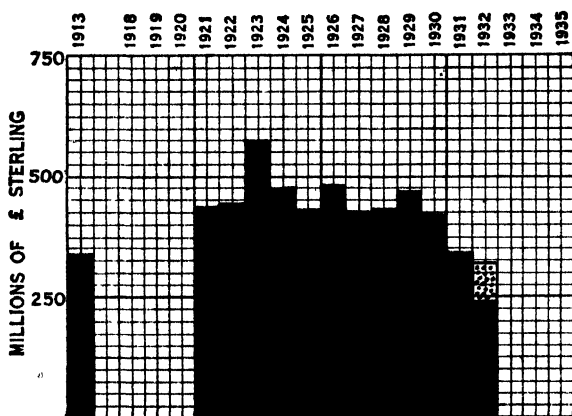


FIG. 533.—The imports of France. Converted at average rate of exchange for each year.

The exchange is now stabilized at 124·21 francs = £ gold. Expressed in francs:

1913	8·4 billions.	1925	44·0 billions.	1930	52·5 billions.
1921	22·8	1926	50·6	1931	42·2
1922	24·3	1927	52·0	1932	29·8
1923	32·9	1928	53·0	1933	28·4
1924	40·1	1929	58·0	1934	23·1
				1936	24·4

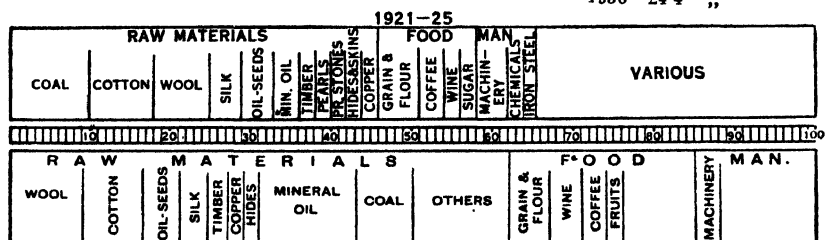


FIG. 534.—The imports of France.

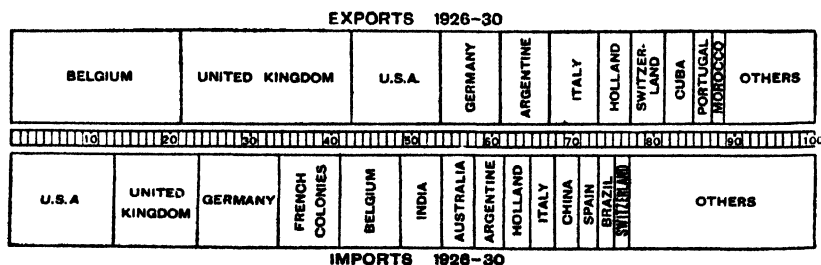


FIG. 535.—The direction of the foreign trade of France.

likened to graduated saucers, one inside the other, the smallest in the centre. In the centre are beds of sands, clays, and marls

in very varied and alternating sequence, of Tertiary age. Some of the sandy tracts are of little use for agriculture and give rise to forested tracts; on the other hand, some of the clayey or marly beds afford ideal agricultural land. A group of limestones—only 90 or 100 feet thick, but very important—form the well-known calcaire grossier of the Paris Basin, and not only afford excellent building stone but produce a series of marked scarps where

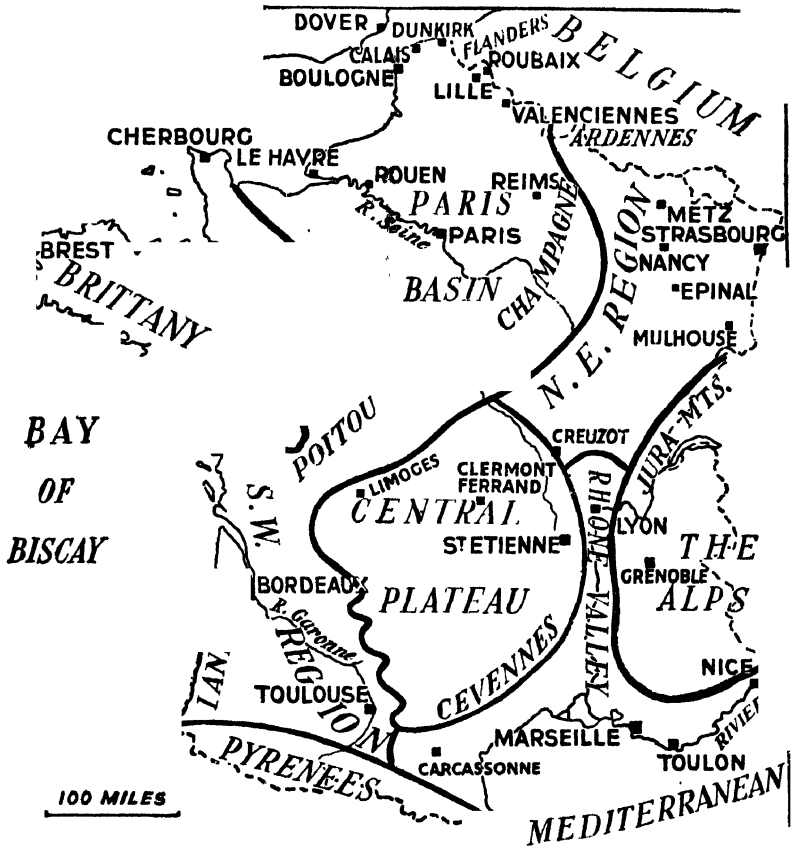


FIG. 536.—The natural regions of France.

cut through by river valleys, thus affording the characteristic scenery of the heart of the basin. Surrounding the Tertiary beds is a broad ring of chalk, cropping out in the downs of Artois, Picardy, Champagne "pouilleuse," and Normandy. Surrounding the chalk is a ring mainly of Jurassic rocks, beyond which are the ancient massifs which surround the basin. The great rivers of the north of France have cut up the Paris Basin into a series of "blocks" of country which have received distinctive names from

the French. The varied geology thus affords striking contrasts within the basin between these different "pays." There are the chalk plains of Picardy with their covering of fertile "loess" (or *limon* of the French), the bare chalk hills of Artois; the fertile valleys of Soissonais; the forested plateau of Brie; the treeless limestone plateau of Beauce, all affording startling contrasts. The contrasts are even more marked than in the scarplands of south-eastern England, and this must be borne constantly in mind in any attempt to generalize on the Paris Basin. Broadly speaking, however, the Paris Basin is the great agricultural region of France, wheat, barley, and root crops being of first importance, with sheep on the drier hills, cattle in the damper areas. In the centre lies Paris, to the north-west its great ports of Rouen and Havre; to the north lies the great industrial region of France, the presence of which is determined by the coal field which underlies the chalk hills. The great coal-field towns include Lille, Roubaix, Tourcoing, Valenciennes, Arras, and others; the port of Dunkirk is the main outlet, Calais and Boulogne serving mainly for cross-Channel traffic.

The Armorican Massif.—This area of old rocks in which the dominant folds have an east-and-west (or "Armorican") trend occupies the province of Brittany and western Normandy. The region is broadly comparable with Devon and Cornwall on the opposite side of the Channel. Much of the ground is too infertile or too exposed to the prevailing westerlies for cultivation, and the life of the region centres in the valleys. Too damp for wheat, the leading cereals are oats, barley, and rye; orchards of apples, pears, and plums are numerous. As in Devonshire, large quantities of cider are made from the apples, and there is an export trade in fruit. The orchards in many areas serve also as small corn fields; near the coast and towns market gardening predominates. Cattle are numerous in the valleys; sheep thrive on the hill pastures and gave rise at an early stage to the textile industries of Rennes and Leval. The former town, as a result of the early impetus of the woollen industry, is now one of the leading cotton manufacturing towns of France. Fishing is important round the coasts, and the conditions which have made the fishermen of Cornwall famous in history, have made the men of Brittany their rivals in this regard. The kinship of the Welsh, Cornish, and Bretons brings the analogy between the English and French Armorican area even closer.

South-Western France.—Lying between the Armorican Massif on the north, the Central Plateau on the east and the Pyrenees on the south, is a broad lowland region, flooded very largely by Tertiary rocks of the Basin of Aquitaine. In the north is the lower Loire basin, centring on Nantes and where Poitou forms the transitional area between the Central Massif and Brittany, the Paris

Basin, and the Aquitaine Basin. Further south one passes into maize-growing country and into the great red-wine region of Aquitaine, centring on the town of Bordeaux and the lower Garonne. To the south of Bordeaux lies a large and remarkable tract of country—the Landes. Formerly a waste of dangerous shifting sand dunes which threatened the fertile land to the east, this is now one vast plantation of pines, covering hundreds of square miles.

The Central Plateau.—The ancient rocks of this central massif furnish but a poor soil, so that, despite a good rainfall, rye and sheep are the dominant notes in the agriculture. The life of the region, on the whole sparsely populated, centres on the little coal fields and the industrial towns such as Creuzot, St. Etienne, Alais, and Clermont Ferrand which have resulted therefrom, or on the volcanic soils of the Puys de Dôme district, and Cantal in the region long known as the Auvergne where the volcanic soils of the valleys are rich. The high south-eastern edge well marks the limit of the Mediterranean *régime*, the waters of the plateau drain towards the north-west, and it is with the climate of the north-west of France that that—much more severe—of the central plateau is linked. The region is large, it covers a sixth of the whole of France. Limoges is a leading town and a centre of the north-west of the plateau.

The Pyrenees.—The succession of chains which constitutes the Pyrenees forms a remarkably complete barrier between France and the Iberian peninsula. Much of the higher parts of the mountains are covered with treeless hill pastures tenanted in summer by herds of sheep and by cows. The valley slopes are forested with pines and oaks and other trees; whilst in the valleys nestle little villages surrounded by their fields of maize and barley. Formerly neighbouring valleys were cut off from one another to a remarkable degree—an isolation reflected in sudden changes in domestic architecture, but the isolation has now largely been destroyed by the ubiquitous motor 'bus. At the foot of the Pyrenees lies an extensive plain—the subpyrenean plain—which forms the transition area to the Aquitaine Basin on the west, stretches to the edge of the central plateau in the centre and fades into the Mediterranean lowlands on the east. The plain is built up of huge quantities of material washed down from the mountains, and the rivers render cultivation difficult by their sudden floods. Toulouse and Carcassonne guard the gap which separates the Aquitaine Basin from the Mediterranean lowlands.

The Rhone Valley and Mediterranean France.—The valley of the Rhone and its principal tributary the Saône lies between the Burgundian Heights (or the Côte d'Or) and the Cevennes in the west and the Jura and Alps on the east, and forms a "couloir" which

has been of the greatest importance throughout history. It is to-day the great line of communication between Northern France and the Mediterranean; a fertile, picturesque valley where the firs and beeches of the north give place to the cypresses and olives of the south. Aspect is of importance in the valley; the vineyards of Burgundy are on southward facing slopes. The silk-manufacturing town of Lyons—no longer dependent upon the limited local supplies of raw silk—is the focus of the northern part of the valley and its growth has been assisted by the near-by coal field of St. Etienne. West of the mouths of the Rhone lies an important wine and olive country, but to the east the Riviera finds its main economic importance in its fame as a winter resort. It should be noted that Marseilles is not on the mouth of the Rhone but lies in a mountain-girt bay to the east, hence the importance of canal communication with the Rhone. Marseilles has a very large trade with India and the East, importing linseed, sesamum, ground-nuts, and copra for her oil and soap factories. Eastern mails to and from England are transferred from steamer and train at Marseilles—less than 24 hours by rail from London. The great shipping trade of Marseilles has caused the development of shipbuilding industries. East of Marseilles is the naval station of Toulon. The great centres of the French Riviera are Cannes and Nice.

The French Alps.—The great mass of the Alps which lies in French territory is penetrated by transverse valleys which have acted as avenues of penetration and have allowed the people and the life of the plains to penetrate far into the mountain mass. Grenoble is the outstanding example of a large town in the heart of the Alps. On the other hand, there are the “high valleys” of the Alps with their little villages of alpine pastoralists so different in character and isolated from the outside world. The important hydro-electric installations of the Alps have already been noted.

Alsace-Lorraine and the East of France.—Geographically the east of France may be grouped as a whole as the “Rhine Region,” but it really comprises at least three units—the portion of the Rhine valley which lies in Alsace; the forested Vosges and Basses Vosges; the Lorraine plateau which lies to the west of the Vosges. The rich plains of Alsace centre on Strasbourg and Mulhouse, and with their busy agricultural population afford an interesting contrast to the great massif of the Vosges, a block of forested, granitic country but sparsely inhabited. The Lorraine plateau with its great iron ore deposits might be considered the outermost ring of the Paris Basin, since it consists largely of Jurassic deposits matching those on the far western side of the basin. The valley of the upper Meuse which lies west of the plateau may be held more probably to bound the Paris Basin. Amongst the towns of Lorraine, Nancy

and Epinal may be noted as textile centres originally dependent on local wool supplies and benefiting from the pure water supplies from the Vosges. It is to be noted that Epinal, Nancy, and Metz all lie on the Moselle, whose valley constitutes one of the most fertile parts of Lorraine.

SPAIN AND PORTUGAL

Position.—The Iberian Peninsula, comprising the kingdom of Spain, the republic of Portugal, and the tiny British possession of Gibraltar, has an area of 225,000 square miles and a population of 28,000,000. Lying between latitudes 36° and 44° , nearly the whole is in the "Mediterranean Belt" excepting only the northern strip. Portugal occupies a compact block of the west coast with an area of 34,000 square miles, but it will be convenient to consider first the peninsula as a whole.

Physical Features.—The heart of the peninsula consists of a great plateau, the meseta, for the most part between 2,000 and 3,000 feet above sea-level. The plateau is bounded on the north-west by the mountains of the old massif of Galicia and on the north by the Cantabrian Mountains, which are continued eastwards into the Pyrenees. The Sierra Morena forms the southern limit of the meseta and running obliquely across its centre is the Central Dividing System. To the north-east of the meseta lies the deep trough forming the Ebro Valley. To the south of the meseta is another trough, occupied by the Guadalquivir Valley, which is separated from the Mediterranean by the fold range of the Sierra Nevada.

With the exception of the Ebro, all the important rivers of the peninsula drain westwards to the Atlantic—the Douro, the Tagus, the Guadiana, and the Guadalquivir. The first three have broad valleys in the lower courses in Portugal, so that on the west the edge of the great plateau is less clearly defined.

Geology and Minerals.—Broadly speaking, the Iberian plateau consists of a stable block of ancient rocks, partly covered with younger sediments, against which the Pyrenean-Cantabrian system was folded on the north and the Sierra Nevada or the Penibetic system (a continuation of the Atlas) was folded on the south. The position of the two great valley regions, the Ebro Valley and the Guadalquivir Valley, is determined mainly by two tectonic troughs. The Iberian peninsula as a whole is rich in minerals, and, as shown in Fig. 537, the interest centres on the northern fold ranges (the Cantabrians); the southern fold ranges (the Sierra Nevada), and the southern fringe of the plateau (the Sierra Morena). Taking Spain alone, in 1930 no less than 150,000 persons were employed in

connection with the mining industries and the total value of the output was 500,000,000 pesetas (£18,500,000 or \$92,000,000).

Mineral	Quantity in metric tons		Value £ millions	
	1925	1931	1925	19—
Coal	5,800,000	6,600,000	7.1	
Anthracite . . .	320,000	525,000	0.4	
Lignite	400,000	340,000	0.3	
Lead	210,000	151,000	4.6	
Copper ore . . .	3,700,000	3,111,000	2.9	
Iron ore	4,500,000	3,190,000	1.7	
Zinc ore	170,000	112,000	0.8	
Mercury	22,600	29,700	0.2	

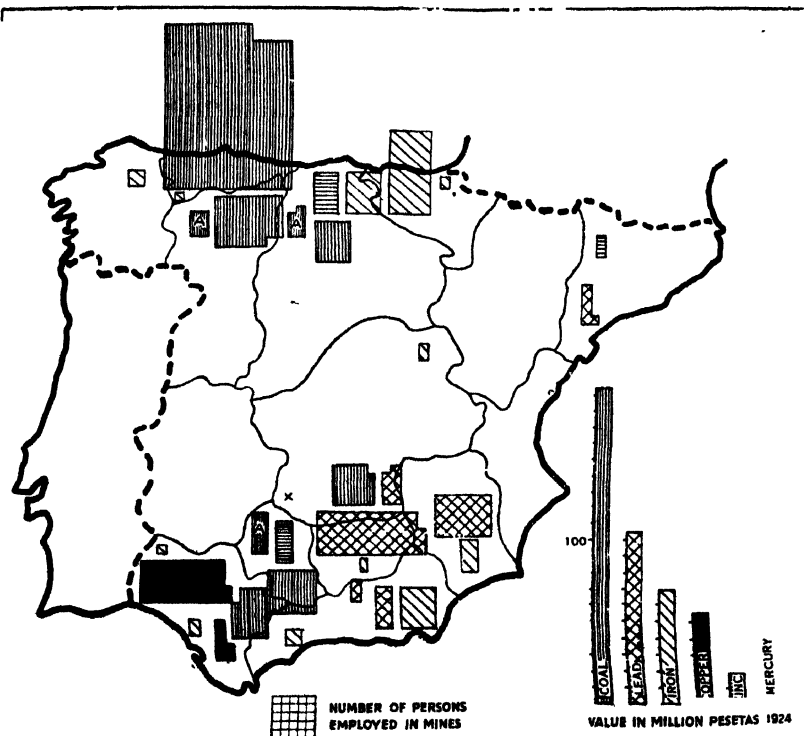


FIG. 537.—The minerals of Spain.

The shaded areas on the map are proportioned to the number of men employed, each small square of the index representing 100 people.

Other mineral products include salt, manganese, sulphur, and silver. The output of cement reached a value of over £2,000,000 in 1925. Most of the coal is mined in the north, the great centre being

Oviedo, but there are also important mines in the south, in the Sierra Morena of Cordoba province and in the Guadalquivir Valley. The lead is mainly from the south, from the Sierra Nevada and Sierra Morena; the big production of copper almost entirely from the western end of the Sierra Morena in the hinterland of Huelva. Many parts of Spain are rich in iron ore, but the principal workings are in the north (Santander and Oviedo) and in the south along the Sierra Nevada. The zinc, also, is from the north (Santander) and south (Granada). Spain's important output of mercury is still mainly from the famous mines of Almaden in the south-western corner of New Castile.

Portugal is, by comparison with Spain, less richly endowed with mineral wealth. Coal is scarce and the want of fuel handicaps the exploitation of the wolfram, iron, copper, manganese, and other minerals which do exist.

Climate and Vegetation.—There is marked distinction between Northern Spain, which has a north-west European type of climate with a good rainfall well distributed throughout the year, and the remainder of the peninsula, which belongs as a whole to the Mediterranean region. It is true, however, that the Central Mountain Divide, by virtue of its elevation, attracts a higher rainfall, and is to a considerable extent covered with forests comparable with those of the northern mountains, so that it is regarded by some as an "outlier" of the north-west European type of climate. The northern part of the meseta may be regarded as transitional in type between North-west European and Mediterranean.

Quite apart from this distinction there is the broad twofold division of the peninsula into the northern and western "pluviose" portion and the central, southern, and eastern "arid" portion. Although the rainfall *régime* of most of the plateau is Mediterranean, *i.e.* there is a rainfall maximum in winter and a dry summer, the elevation results in winters too cold for typical Mediterranean vegetation—for example citrus fruits are absent. Hence the vegetation of much of the high interior is best described as dry steppe land. Forests are important in the northern mountains of Spain, and in Portugal cork from the cork oak forests is one of the great sources of wealth. Resinous pine trees are important in Spain.

Agriculture.—Spain is a predominantly agricultural country. More than 90 per cent. of the surface is classed as "productive," although only 45 can be classed as under production. In Portugal half the country is waste, 17½ per cent. is forested, 26 per cent. under crops (excluding 3½ per cent. under vines), and 4 per cent. under fruit trees.

The following table shows the leading crops of Spain :

Crop	Millions of acres	
	1926	1933
Wheat	10.8	11.2
Barley	4.5	4.7
Oats	1.9	1.6
Rye	1.9	1.5
Maize	1.0	1.1
Peas and beans	2.1	—
Rice	0.1	0.1
Olives	4.1	4.6
Vines	3.3	3.5
Fruits	1.1	1.2

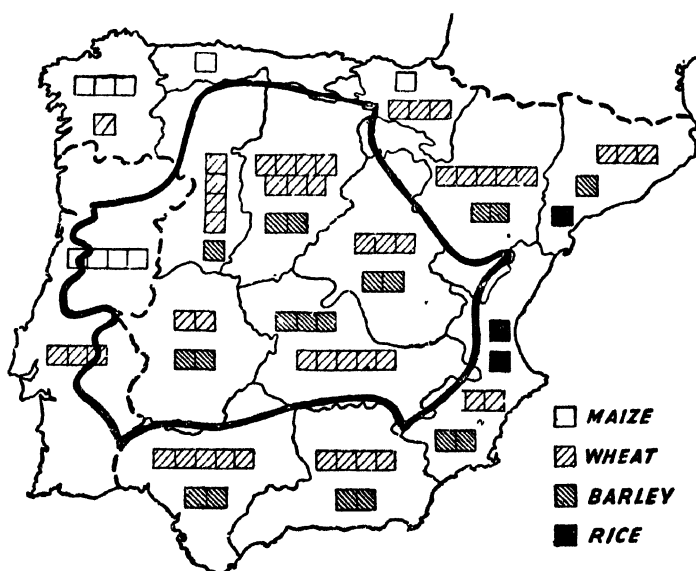


FIG. 538.—The cereal production of Spain (based on 1924 production).

The meseta is enclosed by a heavy black line and the importance of wheat and barley in this area is noteworthy; maize almost exclusively in pluviose Spain; rice in the east.

The distribution of these crops is influenced in a remarkable way by the climate. Most of the wheat and barley is grown on the plateau (especially the northern meseta) and the Mediterranean coastlands, and there is very little in the wetter parts of the north and west. The maize, on the other hand, is almost entirely restricted to the wet north-west; the rye to the poor, dry soils of the north-western part of the plateau. Rice grows in certain sheltered irrigated tracts along the Mediterranean coast. Fig. 539

shows the limits of the olive tree and citrus fruits. The annual production of red and white wines is very large (600–800 million gallons), the largest production being from the Tarragona and Barcelona areas. Wines of the sherry type (taking their name from an English corruption of Jerez near Cadiz) are from the south-west; ports from the lower Douro basin in Portugal (shipped through Oporto). The drying of fruits is concentrated along the Mediterranean coast, the principal region also for sericulture.

The localization of animals in the Iberian peninsula is remarkable. Spain has 3·8 million cows, and Portugal 0·77 million, they are concentrated in the moist regions of the north and west. Spain

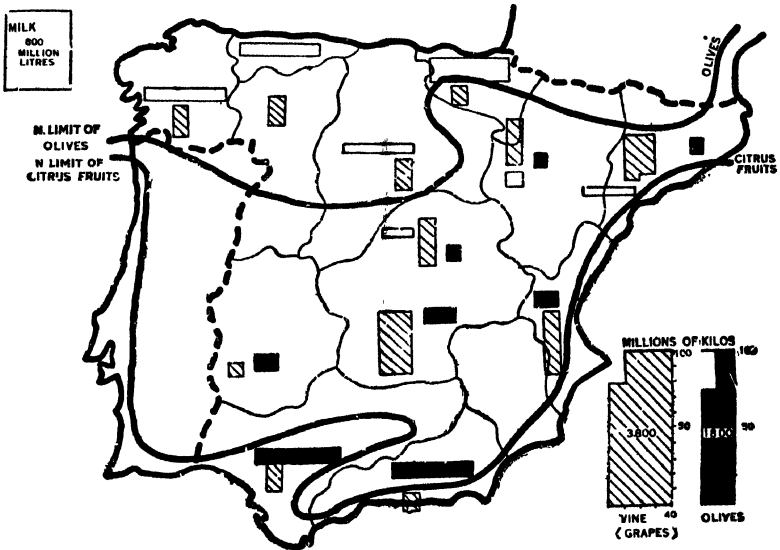


FIG. 539.—Production of grapes, olives, and cow's milk in Spain (based on 1924 production).

has 20·1 million sheep and 4·7 million goats (1935)—Portugal has 3·7 million sheep, and 1·6 million goats (1935); they are nearly all to be found on the dry regions of the plateau. Reference must be made to the seasonal movements of sheep and shepherds from the winter pastures on the plateau to the highland summer pastures amongst the mountains. Pigs are more widely distributed (5·2 million in Spain, 1·1 million in Portugal in 1935).

Fisheries.—The fisheries of Spain employ about 130,000 of the population, the value of the catch in 1931 being 265,000,000 pesetas—mostly sardines, tunny fish, and cod. The canning and preserving factories alone turn out products to the value of 500,000,000 pesetas. Portugal has also important fisheries, centring

on Setubal. The north-western coasts of Spain rank first, followed by the Mediterranean coasts.

Population.—Spain, with a population of 24,000,000, and

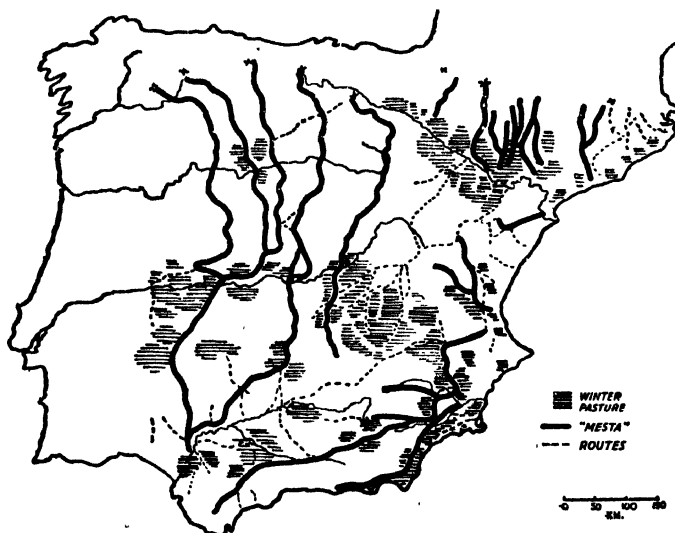


FIG. 540.—The migration of sheep in Spain—past.
‘Mesta’ = main routes recognized by federation of sheep and cattle owners.

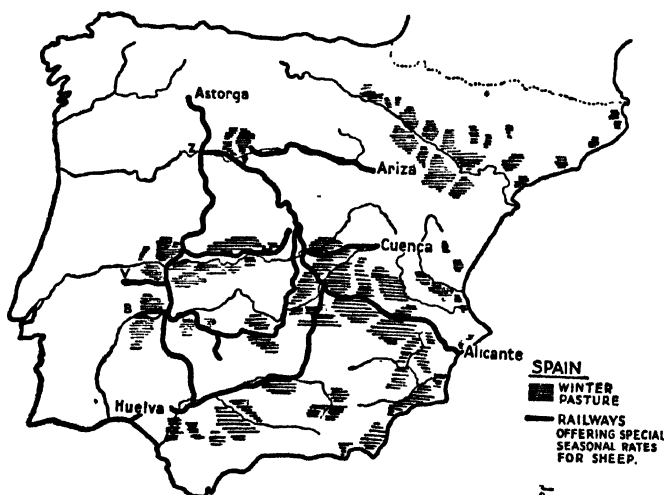


FIG. 541.—The migration of sheep in Spain—present.

Portugal, with 6,800,000, are both somewhat thinly populated. The density in Spain (1933) is 122; in Portugal (1930) 192. It is interesting to notice that population, development, and towns are

all concentrated in the regions surrounding the central plateau—the “dry heart” of the peninsula. Of the 12 towns, 10 in Spain and two in Portugal, with a population of over 100,000 in 1923,

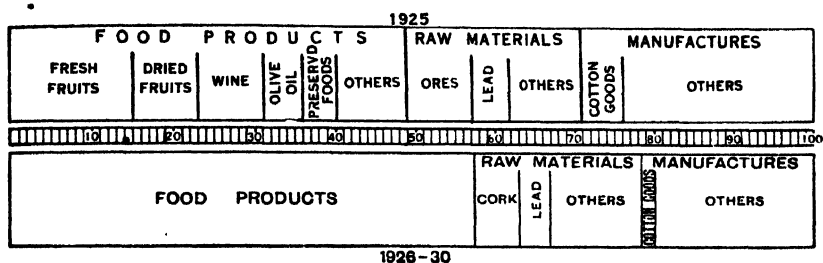


FIG. 542.—The exports of Spain.

no less than 9 are ports, and only one—the capital of Spain—lies on the plateau.

Manufactures.—Spain cannot be described as a manufacturing country, though she now has important manufactures of cotton

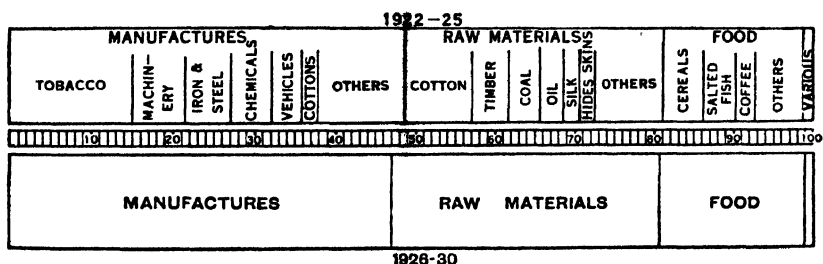


FIG. 543.—The imports of Spain.

goods, mainly around Barcelona, of woollen goods and of paper (from the esparto grass of the plateau). Other industries include glass-making, flour-milling, fish-canning.

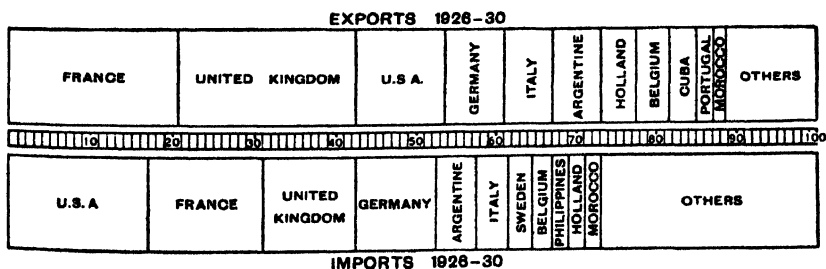


FIG. 544.—The direction of Spanish foreign trade.

Communications.—The Douro and Tagus are both navigable through Portuguese territory to the Spanish border; the Guadalquivir by ocean-going steamers to Seville, and by other craft to

Cordoba and the Ebro beyond Zaragossa. Otherwise the railways form the principal means of communication. There are 11,500 miles of railway, mostly on the gauge of 5 feet 5½ inches.

Foreign Trade of Spain.—It will be noticed from the diagrams that the export trade of Spain, which averaged £35,000,000 in value in 1931-34, consists mainly of foodstuffs—wine, fruits, etc., and

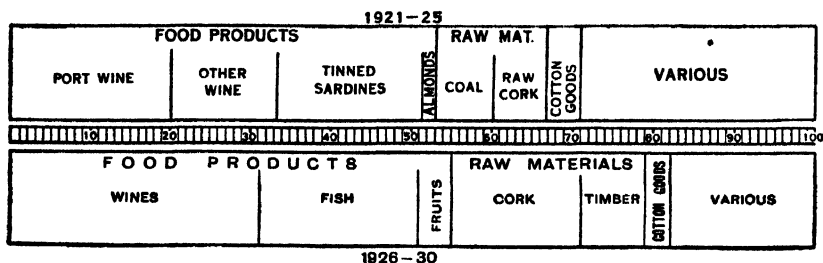


FIG. 545.—The exports of Portugal.

raw materials, especially metals. The imports in the same years averaged £112,000,000 and consist mainly of manufactured goods.

Trade reached a low level in the depression, exports dropping to £26,000,000 in 1933 and imports to £33,500,000.

Foreign Trade of Portugal.—The export trade of Portugal averaged 630,000,000 escudos in 1921-25; the import trade 2,000,000,000 escudos. In 1932 exports were valued at £7,200,000, imports at £17,000,000 (110 escudos = £1 sterling).

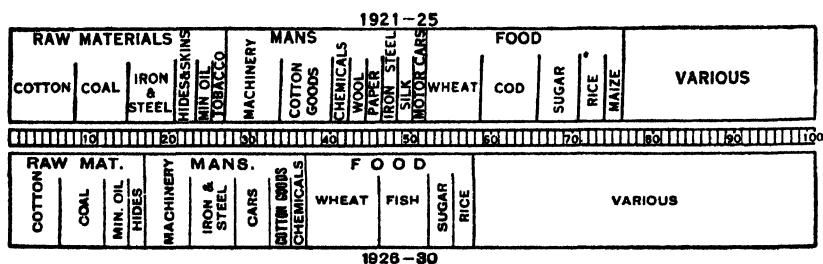


FIG. 546.—The imports of Portugal.

NATURAL REGIONS OF SPAIN AND PORTUGAL

Northern Spain.—Northern Spain comprises broadly that part of the peninsula which has the North-west European type of climate. Though hilly or mountainous throughout, it is one of the important parts of Spain, and the fertile valleys are among the most densely populated. The whole area may be divided at once into three subdivisions:

The Galician Massif, including the plateau region of Portugal

which lies north of the Douro River, in many ways recalls the Brittany Massif of France. Poor, granitic soils do not encourage agriculture, but the rainy equable climate gives a natural vegetation of meadow and deciduous forest. Cattle and maize are the keynotes of the region, the drowned coast with its "rias" is the great fishing ground of Spain.

The *Cantabrian Mountains* include the great coal and iron region of Spain. Oviedo is the coal town; Santander, by virtue of fairly easy access to the interior, serves as the northern port of Madrid. The mountains are lower to the east (Basque mountains) where there are more opportunities for agriculture and general

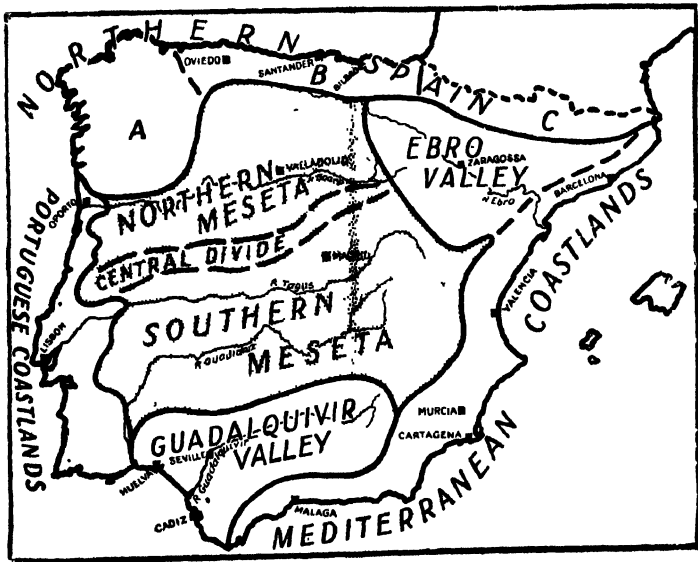


FIG. 547.—The natural regions of the Iberian Peninsula.

development which has been aided by the energy of the Basque people. Bilbao and S. Sebastian lie in this area.

The *Pyrenees* are higher than the *Cantabrians*. The water power resources have been utilized towards the east, but less so than in France. About a million horse-power is actually developed in Spain; the *Pyrenees*, followed by the *Cantabrians*, are the leading regions. In particular the R. Segre, a tributary of the Ebro, has been utilized.

The Meseta.—The great central plateau also falls roughly into three divisions:

The *Northern Meseta* corresponds roughly with the upper Douro Basin, lying in the provinces of Leon and Old Castile, and hence sometimes called the basin of Old Castile. This is, *par excellence*,

the wheat region of Spain, centred round the milling town of Valladolid. Too cold in winter for the olive and the Mediterranean fruits, too arid for the forests of the north-west, it is a "transition region."

The Central Dividing Ranges are forested (though now largely cleared), and in this respect resemble the Cantabrians.

The Southern Meseta corresponds roughly with the basins of the upper Tagus and Guadiana, including the "basin of New Castile." It is a region of poor heathlands not always sufficiently moist to furnish even winter sheep pastures. The capital lies in the northern part of the New Castile Basin, Toledo towards its centre. Forests of the typical Mediterranean oaks, though stunted, cover some of the area, and the olive is found over most of the region.

The Guadalquivir Valley.—This valley lies between the edge of the meseta (the Sierra Morena) and the Sierra Nevada or the Andalusian Cordillera, and corresponds with the Andalusian trough. In this warm, sheltered region of Southern Spain, Mediterranean fruits flourish; the very name of Seville is ineradicably associated with oranges as that of Jerez (near Cadiz) is with sherry. Granada lies in the heart of the Andalusian mountains.

The Mediterranean Coastland.—This long strip consists actually of a number of isolated tracts of cultivable land, backed by high mountains and separated by spurs of upland. The whole region is sunny but very dry, lying as it does in the lee of the plateau. It is along the Mediterranean coastland that irrigation assumes a paramount importance; on the terraced hillsides are fruit gardens, on the alluvial flats at the mouths of the rivers an intricate system of channels and pipes irrigates the huertas and vegas. A huerta has normally two harvests a year, a vega only one. In the huertas an elaborate system of crop rotation is practised, wheat, maize, beans, hemp, are among the leading crops; the vegas are largely devoted to fruit trees. The vines and olives are mainly on the higher, drier grounds; in the dampest parts near the lagoons, banked in by coastal sand dunes, rice is grown. The towns have grown up as natural centres of the more important areas: Malaga and Almeria in the south, where Moorish influence is marked in many ways—not least in the architecture of the flat-roofed houses. Further north Cartagena, Alicante, and Valencia are all in tracts celebrated for their fruits. North of the Ebro mouth the climate is moister, and Tarragona and Barcelona are centres of the great wine-producing region of Spain, whilst Barcelona rivals Marseilles on the other side of the Gulf of Lions as an industrial centre—with cotton, woollen, machinery, and other manufactures.

Murcia is the only inland centre of note.

The Ebro Basin.—This depression is cut off from the Mediterranean coastlands by the Catalanian hills, and though Mediterranean

in climate, is slightly more continental. Large tracts are irrigated, and a variety of crops grown. The valley centres on the old bridge town of Zaragossa.

The Portuguese Coastlands.—Mention has already been made of that portion of Northern Portugal which should be linked with Galicia. The remainder of the country belongs almost entirely to the "pluviose" Mediterranean region, and the country consists of lowlands separated by spurs from the plateau. The spurs are rye-sheep country; the richer lowlands are maize-wheat-cattle country. A large proportion of Portugal is forested, and the food naturally supplied by the acorns affords an explanation of the large number of pigs. The vine, olive, and Mediterranean fruits flourish everywhere on the lowlands, wine constitutes a very large proportion of the exports, mainly Port from the Douro basin. Lisbon, the capital, and Oporto are the two chief towns of Portugal.

ITALY

The kingdom of Italy is slightly smaller than the British Isles, and, with a population of over 42,000,000, everywhere the average density is high. The natural limits of the country are well defined; by the Alps on the north and by the sea on all other sides. There are, in the presence of a high mountain wall and a great northern plain (the Plain of Lombardy) and a hilly peninsula to the south, some points of general resemblance to India. The Apennines form the backbone of peninsular Italy; it should be noticed that they lie very close to the sea in the north-west; swing across to the east coast, and then return to the south-west to pass through the "toe" of Italy into Sicily. The climatic variations in Italy depend largely upon the topography, and so the principal physical regions are also climatically distinct. Italy may be divided primarily into:

- (a) The southern slopes of the Alps in the north.
- (b) The great plain of Lombardy or the plain of the Po.
- (c) Peninsular Italy, in which several subdivisions may be distinguished.

Most of Peninsular Italy has a typical Mediterranean climate, but the plain of Lombardy is cut off from the influence of the Mediterranean by the Apennines, and has very cold winters, with a spring or early summer rainfall maximum.

The Italian Slopes of the Alps face towards the south and towards the sun, and are thus warmer than they would otherwise be. This is particularly so as many of the valleys run north-and-south and open out southwards. Some of the valleys are partially blocked at the southern end, giving rise to the beautiful Italian lakes, visited annually by thousands of tourists. These warm,

Alpine valleys are, in fact, oases of Mediterranean vegetation, where such fruits as the olive and vine flourish. The Alps give place somewhat abruptly to the plains, and along the borders are many towns using electric power obtained from the swift Alpine streams.

The Plain of the Po is the most fertile part of Italy, and supports nearly half the population. The plain is hemmed in on all sides by mountains, except towards the east. Formerly a gulf of the Adriatic, its surface has been built up by the enormous quantity

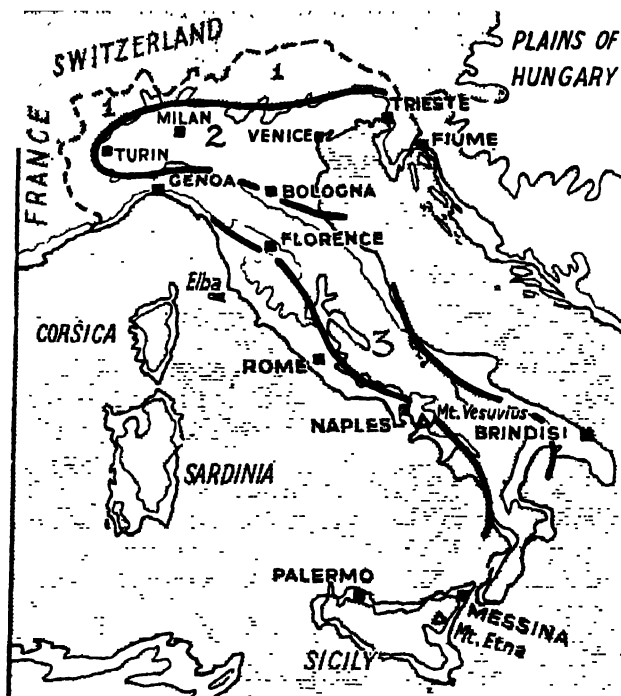


FIG. 548.—The natural regions of Italy.

Land over 1,000 feet, dotted. 1. The Alpine slopes; 2. The Plain of Lombardy; 3. Peninsular Italy.

of silt brought down by the Alpine streams. It is interesting to notice that the Po itself lies towards the south; the result of the greater swiftness of the tributaries coming from the north. In the east the plain is low-lying and subject to floods; less so in the west, though everywhere there is a tendency for the rivers to silt up their beds so that the water-level between the embankments is often above the level of the surrounding plain. The whole is a great agricultural area; wheat, maize, and rice are the leading cereals. This is the leading rice-growing area of Europe, the rice being grown

under irrigation in the west and around the delta in the east. Cattle-rearing and dairy-farming (including the production of cheese) are important industries, and great use is made of the pasture lands of the encircling limestone hills. Mulberry trees grow throughout the plain and have led to this region becoming one of the great silk-producing areas of the world. Silk-spinning is carried on in Como, Milan, and Bergamo; silk-weaving is centred at Milan which vies with Lyons as the premier silk-manufacturing centre of Europe. The supply of cheap hydro-electric power more than compensates for the absence of coal, and together with the supplies of cheap, skilled labour, has attracted other industries to the towns of the

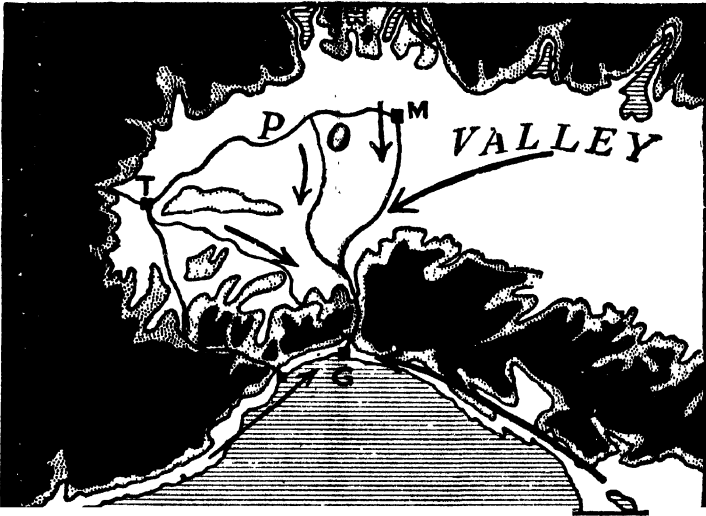


FIG. 549.—The position of Genoa.

Notice the gap to the north of the town, followed by the railway to M. (Milan). The smaller town to the west of Genoa is Savona. Notice the gap leading to T. (Turin). The arrows show the railway routes along the coasts and from the Po Valley. Land above 1,500 feet, black.

northern plain. Cotton and woollen goods are manufactured, the cotton being imported from the United States and the East, and cotton goods are taking an increasingly important place in Italian exports. There are also hemp and jute factories, the home production of hemp being an important branch of Italian agriculture.

Milan is the nodal point for the western portion of the plain. It is the natural junction of the east-west routes with the north-south routes and several trans-Alpine railways converge on Milan. It is only natural that it should have railway workshops and heavy industries. *Turin* commands the Mont Cenis route, and its modern automobile industry is the modern descendant of the old carriage-repairing and smithy's business of such a route town. The historic

town of *Venice* would appear from a casual glance at the map to be the natural outlet of the plain, but it has been supplanted in this respect by *Genoa*, across an important pass in the Apennines. *Verona* and *Padua* are two other towns of the northern group; *Bologna* is the collecting centre of the south-east of the Plain. It should be noted that *Trieste* and *Fiume*, though situated in Italy, owe their importance to their being outlets for Central Europe.

Peninsular Italy is divided by the Apennines into an eastern and a western portion. Actually, it is convenient to consider five sub-regions—the Northern, Central, and Southern Apennines; the Western Coast, and the Eastern Coast.

The Northern Apennines in the north-west are continuous with the Maritime Alps. The mountains drop sharply to the sea and there is no coastal plain along the Italian Riviera. The Altare and Bocchetta passes have determined respectively the positions of Savona and Genoa, and the latter has permitted Genoa to serve as the main outlet of the Po Basin. Favourable lower slopes permit the growth of Mediterranean fruits; characteristic oak-chestnut forests cover other slopes. The marble of Carrara is world famous.

The Central Apennines are broader than the northern, and comprise a large stretch of barren inhospitable limestone country with a Karst type of scenery.

The Southern Apennines are again narrower and include many volcanic areas.

The Western Coast cannot be described as a coastal plain, but consists of a tangled mass of volcanic hills, isolated peaks, and plains. The rainfall is heavy, being exposed to the full force of the westerlies. Formerly the low lands were marshy and malarious but the swamps have now been very largely drained. Much of the volcanic soil is highly fertile, especially around Naples, maize and wheat being the leading cereals with the vine and olive tree also of great importance. *Rome*, at the head of navigation on the Tiber, is the political capital of the country, as well as the seat of the Vatican. *Naples* has developed recently into a great industrial city. There is an abundant supply of cheap unskilled labour and the development of industries—notably textiles, sugar-refining, and motor-engineering—has been carefully fostered by local authorities. *Leghorn* is the other great centre and port of the Western Coast. The famous iron ores of Elba are smelted on the coast of the mainland near by. *Florence* is an old seat of learning and art.

The Eastern Coast is narrow except in the south, where it merges into the peninsula of Apulia. The east coast is drier than the west.

The Island of *Sicily* is famous for its fruit, particularly lemons, and silk; its largest town, *Palermo*, carries on iron-smelting;

Messina is only recently recovering from its destruction by earthquake in 1908. Sulphur from the volcanic regions is a noteworthy product. The island of **Sardinia** has rich mineral deposits, but is still undeveloped.

Communications of Italy.—The directions followed by the railways are determined very largely by the mountain chains. The convergence of trans-Alpine routes on the northern plain should be carefully noted. Brindisi formerly occupied the place of

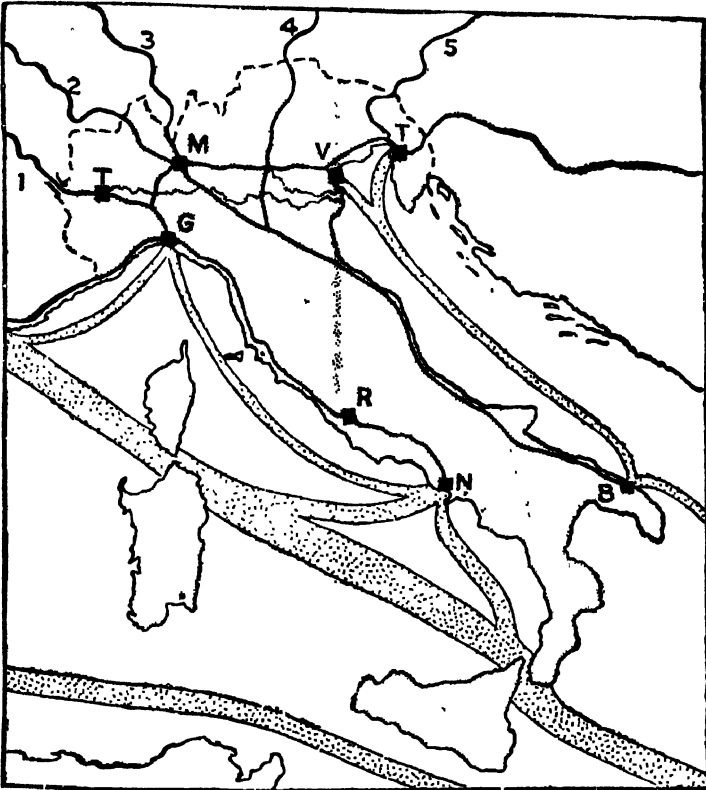


FIG. 550.—The railways and steamship routes of Italy.

Identify carefully each of the towns marked by letters and each of the railways through the Alps marked by numbers.

Marseilles as the port of call for steamers taking on English mails for India and the Far East, but various reasons prevented the post-war return to this arrangement. Among navigable waterways only the Po and certain of its tributaries are of importance.

Population.—Italy is, broadly speaking, over-populated. Poverty is widespread and the standard of living is low. Consequently large numbers of Italians emigrate, formerly to North

America, now to South America. In the years 1901-1913 the annual number of emigrants exceeded 600,000, in 1930 to 1933 it was about 180,000. The Italians cannot emigrate to their own colonies to any great extent, for until the annexation of Abyssinia in 1936 Italy's only possessions were three areas in Africa, largely desert. These are Tripoli, Eritrea, and Somaliland. Abyssinia offers rather more scope.

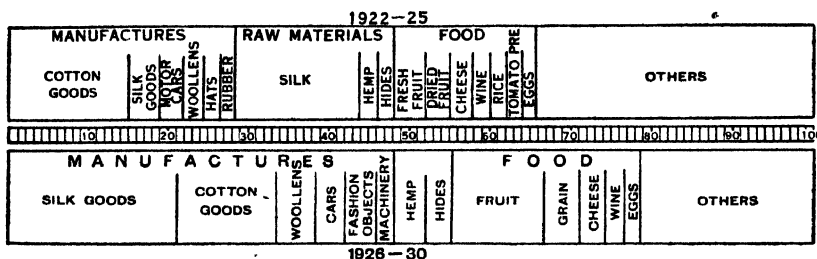


FIG. 551.—The exports of Italy.

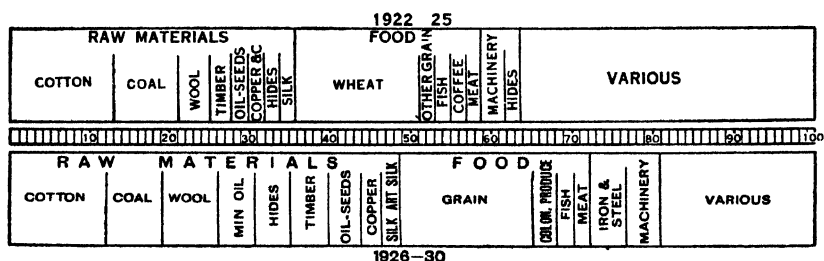


FIG. 552.—The imports of Italy.

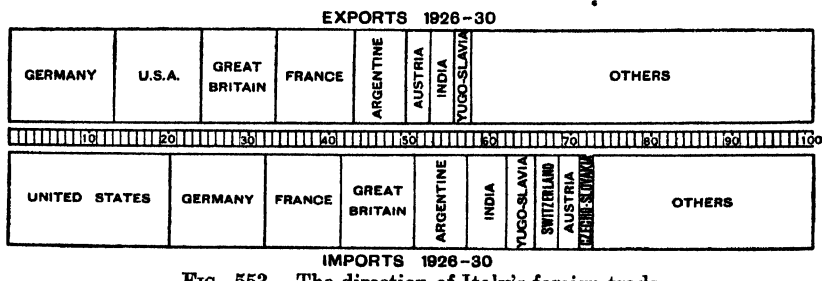


FIG. 553.—The direction of Italy's foreign trade.

Foreign Trade.—The unfavourable balance of trade is noteworthy. Among the imports the high place taken by wheat indicates the shortage of food; the rapidly increasing import of raw cotton bears witness to the expansion of the cotton manufacturing trade, the cotton is mainly from the United States and India. Italy's large import of coal comes mainly from Great Britain and Germany. Among exports the high place occupied by cotton goods is noteworthy.

SWITZERLAND

The little republic of Switzerland, situated right in the mountainous heart of Europe, has an area of 16,000 square miles and a population of over 4 millions. Although five-sevenths of the country are mountainous and a half occupied by uninhabitable high mountains, the average density of 255 is more than double that of Ireland. From a commercial point of view Switzerland is in some respects very remarkable. With little coal and little iron, it is yet pre-eminently a manufacturing country, manufactured goods form the bulk of its exports, raw materials and food the bulk of its imports.

Switzerland is divisible into three :

(a) The southern half forms part of the main chain of the Alps and is very mountainous.

(b) In the north is a small strip of the Jura Mountains.

(c) Between the two lies the Swiss Plateau.

Most of the cultivated land is found in the Swiss Plateau, and there most of the people live. The country is not naturally very fertile, but the Swiss are industrious, and have used every inch which can be used. The crops are the same as in neighbouring parts of France and Germany but the moistness of the climate, due to the mountainous character of the country, causes Switzerland to be better adapted to pasture grasses than to the growing of food crops. Excluding waste land and forests, 70 per cent. of the land is devoted to cattle-rearing ; 30 per cent. to agriculture. The most important occupation is thus dairy-farming, and Switzerland is famous for its cheese and condensed milk. In summer the cattle live on the grass on the mountain sides ; in the cold weather, when the mountains are snow-covered, they are brought down to the valleys. The word " Alp " means a mountain pasture. In the absence of coal, Switzerland has developed its water-power to the extent of over $1\frac{1}{2}$ million horse-power. Many of the railways have been electrified, and many of the factories are operated by electricity. Transport is expensive, and so Switzerland has specialized in the manufacture of objects requiring but small quantities of raw material but necessitating cheap skilled labour. Watches and clocks, for example, are made at *Neuchâtel* and *Geneva* and in the small towns of the Jura Mountains. Similarly, fine silk goods are made at *Zurich*, *Basle*, and *Bern* ; fine cotton goods at *Zurich* ; embroidery at *St. Gall*. Milk is tinned at *Vevey* and many other places:

The mountains of the Alpine Zone are very beautiful, and every year huge numbers of tourists visit Switzerland from all parts of Europe. They go in winter for winter sports, and in summer

for mountain-climbing. The tourists bring considerable wealth to the country and support the large numbers of hotels. Many of the valleys which face south are warm, and rendered warmer by the Föhn winds. The Föhn winds blow down from the mountains, the air being compressed and warmed by its rapid descent.

Switzerland imports raw materials (cotton, silk, and wool) as well as metals (especially iron and steel) and foodstuffs (wheat, sugar, and vegetables). The import of coal is considerable, also of coarser cotton manufactures. The exports are manufactured goods (fine cotton and silk goods, watches and clocks, and machinery), as well as cheese and tinned milk. The ports utilized by Switzerland are *Antwerp, Rotterdam, Havre, Marseilles, and Genoa*. The trade is principally with Germany, France, the United Kingdom, United States, and Italy.

Switzerland lies at the meeting-point of many routes. *Geneva* has been made the headquarters of the League of Nations. Two important railway tunnels pass through the Alps from Switzerland—the Simplon and St. Gotthard. Two other important railway tunnels through the Alps are outside Switzerland—one to the west connects France and Italy (Mont Cenis Tunnel), the other to the east connects Austria and Italy (Brenner).

THE DANUBE LANDS

The Danube, not inaptly described as the greatest river of Europe, rises in the Black Forest region of Southern Germany, but flows for the greater part of its course through a group of countries which, before the Great War, formed the Austro-Hungarian Empire. Under the general title of the Danube Lands, it is convenient to consider the countries which have arisen as a result of the disruption of the old empire (Austria, Czechoslovakia, Hungary, and Yugoslavia) together with Rumania and Bulgaria, between which the Danube flows before emptying into the Black Sea.

AUSTRIA

The present republic of Austria has an area of 32,000 square miles—slightly larger than Scotland or the State of Maine—and a population of 6,500,000. Austria is now almost entirely a mountainous country, and includes the eastern end of the Alps (known as the Tirol). *Innsbruck* is the principal town of this western part of Austria. Cutting through the east of the country is the Danube, and the valley of the Danube is the most important part of the country. Just where the Danube leaves the mountains and enters the Hungarian Plain lies *Vienna*, the capital. When Vienna was

the capital of the old empire it was a very large and flourishing city ; it has steadily regained its reputation as an international centre of learning and the arts and more than one-fourth of all the people in the country live in Vienna.

Austria has little or no good coal, but water-power can be developed in the mountains. It has some mineral deposits, especially of iron at *Eisenerz*, and of salt. The working of iron and steel is carried on chiefly at *Steyr* and *Donawitz*. Vienna occupies an important position in Central Europe at the meeting of main routes, with outlets to Venice and Trieste, but it will be long before Austria can become a prosperous country. It is so mountainous that it cannot grow sufficient food for its people. Agriculture is carried on mainly in the Danubian tracts ; the Alpine provinces are devoted to forestry and the rearing of cattle, as in Switzerland.

HUNGARY

In many respects Hungary is exactly the opposite of Austria. It is a little larger, and has a few more people, but whereas Austria is almost entirely mountainous, Hungary is almost entirely a plain. The Plain of Hungary, running through the centre of which is the Danube, is shut in on all sides by mountains. As a result of the wall of mountains, Hungary is cut off from the moderating influence of the sea and has a continental climate of great extremes. The people of Hungary, the Magyars, are essentially agriculturists. The natural vegetation of the plain is steppe land and there are few trees. But the natural grass land has almost disappeared. Some of the soil is poor, especially in the north, and rye, oats, and barley are the principal crops. But on the richer land farther south wheat and maize are the main crops, and the yield of good quality wheat is high. Sugar-beet is also grown. Many cattle are kept and fed upon fodder crops or corn, specially grown. Most of the industries of Hungary are connected with agriculture—flour-milling, sugar-making, and distilling. Hungary has deposits of good coal in the south-west near Pecs, and also deposits of lignite, but has little or no iron or other minerals.

Budapest, the principal town, really consists of two towns, one on either side of the River Danube. It is situated just where the Danube passes through the only hill range in Hungary, and where the river can be bridged. Budapest is an important railway junction, and the natural collecting centre of the plain. The Danube and its tributaries are also used for transport. *Szeged*, on the River Tisa, is the largest town in the south of Hungary.

Wheat and wheat flour make up more than a quarter of the exports of Hungary ; cotton and woollen goods a quarter of the imports, but manufactures are being developed in Budapest.

CZECHOSLOVAKIA

Another country which has arisen in Europe as a result of the Great War is Czechoslovakia. Before 1918 it was part of the Empire of Austria-Hungary. It is a mountainous country in the heart of Europe with an area of 54,000 square miles—rather larger than England—and a population of 14,500,000. The country consists of three parts :

(a) The Czech (Bohemian) Plateau, surrounded by mountains and sloping gently towards the north-west, *i.e.* towards Germany. The plateau is drained by the River Elbe and its tributaries the Moldau and Eger. The Elbe flows through a gap in the north and then through Germany.

(b) The valley of Moravia in the centre cuts the country in half. In the south the River March flows southwards and joins

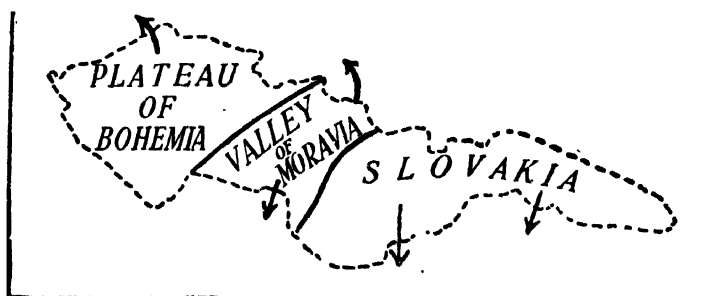


FIG. 554.—The natural regions of Czechoslovakia. The arrows show the natural outlets of each region.

the Danube. In the north the River Oder cuts through the mountains by the Moravian gap and passes through Silesia and Germany.

(c) The mountainous mass of Slovakia in the east consists of the southern slopes of the Carpathians and the numerous mountain valleys, with fragments of the Hungarian Plain.

These three distinct units are united by a strong national feeling, but amongst the difficulties in governing may be mentioned the considerable Magyar population in the valleys of southern Slovakia as well as the large German population of Bohemia. Czechoslovakia, notwithstanding these difficulties, has become one of the most stable of the new countries of Europe.

The Czech Plateau has numerous rich coal fields, both of hard coal and lignite. Various minerals occur in the surrounding mountains. The broad valleys of the rivers which drain the plateau—the Moldau and the Elbe—have very rich alluvial soils and produce crops of very high quality. Potatoes and wheat form the staple food of the people, but hops are grown for brewing

(Pilsener beer at Pilsen) and sugar-beet for making sugar. Cotton-mills, glass and chemical factories have sprung up on the coal fields, whilst paper-mills and saw-mills are found near the forested mountains where water-power is available. Iron ore is found between *Praha* and *Pilsen*, and both these places have iron and steel works, whilst *Praha* (Prague or Prag), the capital, has manufactures of many kinds. In the higher and poorer parts of the plateau rye, oats, and barley take the place of wheat.

The **Moravian Lowlands** have also good agricultural lands where barley and sugar-beet are grown and, in the south, maize and fruits. But the lowlands have rich coal fields—in the north is part of the Silesian coal field, and there are other coal and lignite fields farther south. The coal fields have attracted manufactures—woollen goods and machinery are both made at Brno. The Moravian Lowlands have two outlets—one to the south through

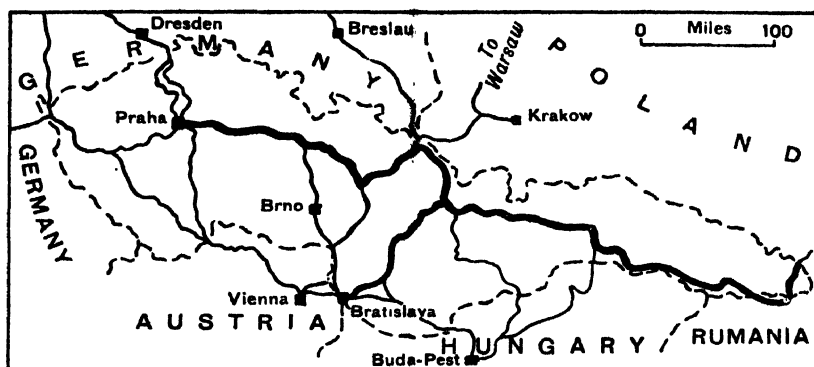


FIG. 555.—The railways of Czechoslovakia in 1935.

the river port of Bratislava on the Danube; one to the north through the Moravian gate.

The **Carpathians** are largely covered with valuable forests and many places are rich in minerals. They require development. In the mountain valleys barley, sugar-beet, and potatoes are grown, whilst numerous cattle and sheep flourish on the mountain pastures.

Communications and Trade.—Czechoslovakia is in an unfortunate position regarding communications. There was no railway from one end of the country to another. The natural outlet of Bohemia is down the River Elbe through Germany to Hamburg. The outlet of Moravia is down the Oder to Stettin, or through Bratislava on the Danube. The railways from Bohemia and Moravia centre on Vienna in Austria, and those from Slovakia centre on the Hungarian capital of Budapest. Thus the trade of Czechoslovakia passes through many different countries and in many directions. Raw cotton and raw wool represent a fifth of the country's imports (1934); cereals and animal foodstuffs

a tenth. First place amongst exports is taken by cotton manufactures (10 to 15 per cent.), woollen goods, cotton yarn, iron and iron manufactures, sugar and glassware. Timber, coal, and lignite figure among the raw material exported. The total value of the imports is over £40,000,000, and of exports rather more.

YUGOSLAVIA

Yugoslavia is another of the states which grew up after the Great War from the break-up of Austria-Hungary. It consists of the old kingdoms of Serbia and Montenegro, together with a broad tract of land along the Adriatic Sea as far as the Italian border. The area is about 96,000 square miles, and the population 14,000,000—a density of 145 per square mile.

The country falls into three parts, very different from one another :

- (a) The mountainous region of the Adriatic Coast.
- (b) The northern plain—part of the Hungarian plain.
- (c) The southern mountainous region—part of the Balkan Peninsula.

The Adriatic Coast, or Dinaric Region, consists of the fold ranges of the Dinaric Alps. Most of the hills are of limestone. Great underground channels have been formed in the limestone by the action of water, and much of the drainage is now below the surface. The natural result is that the surface is dry and barren, and the special name of “Karst,” or Karstlands, is given to this type of country. The ranges run parallel to the coast, rendering difficult communication between the fertile interior and the coast. Although Yugoslavia has a long coast-line it is of very little use, and there is no large port. Crops can only be grown in a few of the more favoured valleys and along the maritime strip of Dalmatia, which is typically Mediterranean. To the north, near the Alps, the country is richer and has forests and mineral deposits, including coal mines west of Zagreb.

The Northern Plain, entirely cut off from the influence of the Mediterranean, has a continental climate—hot summers and cold winters. But the soil in many parts is rich and much wheat and maize are grown, together with tobacco and sugar-beet. Indeed, the plains north-east of the Danube are an almost unbroken stretch of wheat and maize. Subotica is the centre of this tract. Zagreb is the principal town of the west of the plain, and has industries connected with the local agriculture. West of Zagreb the agricultural land is found in isolated basins. Plums are grown on some low hills to the north and dried as prunes.

The Southern Region is large and varied, highest in the south and sloping on the whole northwards towards the Danube. The hills are sometimes forested, at other times clothed with mountain pastures suitable for cattle and sheep. There are deposits of iron, lead, and other minerals in places. But the most important parts of the region are the sheltered valleys, where wheat, maize, and fruits flourish. Large quantities of plums are grown and dried for export, as "prunes." They are also used in making a kind of brandy, the national drink of the Serbians. Other crops include the vine, sugar-beet, hemp, and tobacco. The capital, *Belgrade*, lies upon the junction of the Save with the Danube and between the northern plain and the southern region. *Nish* commands the route to Salonika and Constantinople.

Communications.—The kingdom of Yugoslavia has two main outlets—one in the south through the Greek port of Salonika, the other in the north through the new port of Susak (close to Fiume which is in Italy). Another port in the north is *Trieste*, also in Italy. Efforts are being made to develop Split, Dubronik and Kotor as national ports. The country exports timber, fruit (prunes), animals, wheat, and maize, and imports manufactured goods, especially textiles. It is still somewhat undeveloped, and in the main an agricultural country.

RUMANIA

Rumania is a kingdom which has nearly doubled in size since the Great War, and now includes a large part of the former Empire of Austria-Hungary. It is now considerably larger than the British Isles, and has a population of 18,025,000. Forming a great curve of mountains throughout the centre of the country, and dividing it into two distinct halves, are the Carpathian Mountains and the Transylvanian Alps. Rumania is thus divisible into

(a) The Wallachian Plain—the valley of the Lower Danube—and the Bessarabian-Moldavian Plateau which lie to the south-east of the mountains.

(b) The mountains which form a broad barrier through the country.

(c) Transylvania and the Banat, on the west of the mountains, which form a mass of hills and sheltered valleys.

The Wallachian Plain has a continental climate with hot summers, cold winters, and a low rainfall, falling mainly in early summer. It is part of the steppe lands, and is now one of the great wheat lands of the world. Huge quantities of wheat, barley, and maize are grown, the maize mainly in Bessarabia with oats on the poorer lands farther north. *Bucharest*, the capital, lies in this

region, *Galatz* and *Braila* are river ports on the Danube. Dobruja the region south-east of the Danube, differs from the Wallachian Plain. Half of it is marshy and useless, the remainder is mainly pastoral country, producing large quantities of wool. The port of the region is *Constanta* on the Black Sea, which is free from ice all the year. Many of the towns of the Wallachian Plain have developed industries connected with agriculture—flour-milling, brewing, distilling, and sugar-making.

The Mountains are forested up to 5,000 feet, especially on the Transylvanian Alps. On the lower slopes are beech trees, on the higher parts soft-wooded coniferous trees grow. The logs are floated down the rivers to saw-mills at Galatz. Above the forests are summer pastures with large numbers of sheep.

In the foothills of the mountains, especially near Ploesti, are rich oil fields. In the production of oil Rumania ranked fourth among the countries of the world in 1932. The oil is refined at Ploesti and sent by pipe-line to Constanta.

Transylvania and the Banat have valuable mineral deposits—gold, silver, copper, lead, iron, and coal—as yet little developed. Many of the hills are wooded, forests covering 40 per cent. of the surface; large numbers of sheep are kept on the hill pastures, while cultivation is carried on in the valleys. Maize is the principal crop.

Rumania is essentially an agricultural country. Its principal exports are maize, barley, wheat, wheat flour, timber, petroleum, and livestock; its imports are cotton and woollen goods, iron, steel, and machinery.

Before leaving Rumania, the difficulty of communication between one part of the country and another should be noted. The Danube is an international river; but, unfortunately, its lower course is frozen in winter. Notice where the Danube passes through the great gorge known as the Iron Gate, now made navigable, and thus cuts through the mountain barrier which separates the Hungarian Plain from Wallachia.

BULGARIA

Bulgaria is a small and mountainous kingdom, lying among the Balkan Mountains in the south-east of Europe. Although the Danube forms the northern boundary, Bulgaria is more correctly considered a purely Balkan country than one of the "Danube lands." It falls into three parts:

- (a) The Valley of the Lower Danube in the north.
- (b) The Balkan Mountains and the Rhodope Mountains.
- (c) The Valley of the Maritza.

Bulgaria lies outside the Mediterranean climate region and suffers from very cold winters. Compared with most of the countries of Europe, Bulgaria is undeveloped. Agriculture is the chief occupation of the people, and two-thirds of them depend entirely on the agriculture; but the cultivation is of a primitive kind. One-third of the whole country—mostly in the two valley regions—is cultivated; rather less than one-third—mainly on the mountains—is under forests of oak and beech. Large numbers of sheep and goats are kept on the mountain pastures, and large numbers of pigs feed on the acorns in the oak forests. The principal food crops are wheat and maize; large areas are also planted with tobacco and sugar-beet. Fruit grows in abundance, especially in the sheltered valleys of the south-west. The Maritza Valley used to be famous for a very valuable perfume, attar of roses, made from roses. A little is still produced.

Sofia, the capital, is the largest town. Notice its important strategic position on the main railway route (the Orient Express Route) between Europe and Asia Minor. *Plovdiv* (*Philippopolis*) is the centre of the Maritza Valley. In the neighbourhood mulberry trees are grown and sericulture carried on.

Ruschuk is a river port on the Danube; *Varna* is on the Black Sea.

Bulgaria exports tobacco, cereals (maize), and eggs, and imports cotton and woollen goods, iron and machinery.

ALBANIA

The mountainous state of Albania, between Yugoslavia and Greece, is the wildest region in Europe. Until 1925 it had no railways, scarcely any roads, no banks and no money, and practically no foreign trade. The wild hill tribesmen provide for their own needs, and large areas of the country are waste land. The country is being rapidly developed under Italian influence.

GREECE

Greece is a mountainous country occupying the southern part of the Balkan Peninsula. Its present boundaries embrace an area of 49,000 square miles and a population of six and a quarter millions. It really consists of three parts:

(a) The northern portion, stretching from the Adriatic Sea, across the Balkan Peninsula and round the Ægean Sea. Along the Ægean Sea are the plains of Thessaly, Macedonia, and Thrace, separated by mountain spurs.

(b) The southern portion, a peninsula with an isthmus so

narrow that it has been cut across by a canal only four miles long (the Corinth Canal).

(c) The archipelago and the large island of Crete.

Greece is so mountainous that only one-fifth can be cultivated. Most of the mountains are dry limestone ridges, often nearly bare, but forests cover them where conditions are better, as on the west of the main hills. The climate is typically Mediterranean, but Greece suffers from a rather low rainfall. This makes cultivation difficult, for there is little water available for irrigation. Most of the cultivation is carried on, and most of the people live, on the small tracts of alluvium. The principal grains are wheat, barley, and maize, but Greece is particularly famous for its fruits. The staple exports are tobacco and currants, the dried fruit of a vine with very small grapes. The greater part of the currants come from the west coast around Patras. Olives are abundant; nuts are grown in large quantity, and so are figs, oranges, and lemons. Tobacco is another big crop. There are many sheep in the northern regions and wool is produced. Of the mineral deposits in Greece, those of iron, lead, and magnesite are most important. Greece is mainly an agricultural country, and the industries depend directly on the products of the soil. The principal industries are the preparation of olive oil, wine, cheese, leather, and soap.

The long and wonderful history of Greece is largely the result of its situation, almost between Europe and Asia near the ways which carried the traffic between those continents. Remains of ancient cities are scattered over the country and render it of great interest. The capital, *Athens*, has been a famous city for more than four thousand years. The long coast-line of Greece has numerous good harbours. A notable port is *Salonika*, through which passes much of the trade of Yugoslavia. The ancient town of Athens has the modern port of *Piræus* close by, with a fine natural harbour. *Patras* is the great currant port. *Candia* is the principal town of Crete. The principal exports of Greece are tobacco and currants, other fruits and olive oil—more than four-fifths of the total. The imports include grain, sugar, and other foodstuffs and manufactures. A large proportion of the trade is with the United Kingdom and the United States, Italy, and Germany.

TURKEY

Turkey in Europe is now restricted to a small tract of land round the great city of Constantinople, extending as far westward as Adrianople and the lower course of the Maritza River. The importance of Turkey's position, as guarding the entrance to the Black Sea, has been mentioned already, but both sides of the Dardanelles and Bosphorus have now been demilitarized.

EXERCISES

1. The Population of the British Isles. The next census will be taken in 1931. Complete the table from the *Statesman's Year Book*.
2. Coal Production of Great Britain. Keep up to date from the *Statistical Abstract*.
3. The Foreign Trade of the United Kingdom. Keep Figs. 512 to 515 and figures up to date from the *Annual Report on the Balance of Trade* or the *Statesman's Year Book*.
4. Russian Trade. Keep Fig. 520 up to date from the *Statesman's Year Book*. (9·5 roubles = £1.) Notice carefully that the exports are expressed in terms of 1913 prices.
5. Agriculture in Russia. Keep up to date the table from the *International Year Book of Agricultural Statistics*.
6. The Foreign Trade of Germany. Keep Figs. 522 to 525 up to date from the *Annual Report on the Balance of Trade*.
7. Agriculture and Mineral Production of France. Keep up to date from the *Statesman's Year Book*.
8. Foreign Trade of France. Keep Figs. 531 to 534 up to date from the *Annual Report on the Balance of Trade*.
9. Mineral Production of Spain. Keep the table up to date from the *Statesman's Year Book*.
10. Agriculture in Spain. Keep the table up to date from the *Statesman's Year Book*.
11. The Foreign Trade of Spain. Keep the figures up to date from the *Annual Report on the Balance of Trade* or the *Statesman's Year Book*.
12. The Foreign Trade of Italy. Keep Figs. 551 and 552 up to date from the *Annual Report on the Balance of Trade*.

EXAMINATION QUESTIONS

1. Give a reasoned account of the industries of Switzerland. (*Univ. London Inter. B. Com.*, 1925.)
2. Describe the course of the Danube and its chief tributaries in relation to the relief of Central Europe. (*Univ. London Inter. B. Com.*, 1925.)
3. Select any three of the following ports and discuss their position and the nature of their trade: Barcelona, Naples, Genoa, Marseilles. (*Univ. London Inter. B. Com.*, 1925.)
4. Divide France into natural regions, giving a short description of each region. (*Univ. London Inter. B. Com.*, 1925.)
5. Describe and account for the distribution of population in Norway. (*Univ. London Inter. B. Com.*, 1925.)
6. Give a geographical account of the Ebro basin. (*Univ. London Inter. B. Com.*, 1926.)
7. Give a reasoned account of the main resources of Switzerland, and of the occupations of the inhabitants. (*Univ. London Inter. B. Com.*, 1926.)
8. Name four important trans-Alpine railway routes, and give some account of any two of them, indicating the areas served and the characters of the traffic carried by each. (*Univ. London Inter. B. Com.*, 1926.)
9. Compare the relief of the Iberian and Balkan peninsulas, showing in each case the relation between the relief and the main lines of communication. (*Univ. London Inter. B. Com.*, 1926.)

10. Give a geographical description of the Basin of the Severn. (*Univ. London Inter. B. Com.*, 1927.)
11. Discuss the distribution and the importance of the coal fields of Germany. (*Univ. London Inter. B. Com.*, 1927.)
12. Give a concise account of the general geography of Holland. (*Univ. London Inter. B. Com.*, 1927.)
13. Give geographical reasons for the limitations of the foreign trade of either Switzerland or Czechoslovakia. (*Univ. London Inter. B. Com.*, 1927.)
14. Describe the course of the Rhine and discuss the significance of its valley as a traffic route. (*Univ. London Inter. B.Sc. Econ.*, 1927.)
15. Consider the trade outlets of either Poland or the Serb-Croat-Slovene Kingdom. (*Univ. London Inter. B.Sc. (Econ.)*, 1926.)
16. Compare the natural resources of the United States of North America and the British Isles. Show how the extent of these resources has influenced the foreign policy of these two nations. (*Univ. British Columbia Sessional*, 1927.)
17. Indicate the importance of coal in the external commerce of Great Britain. (*Univ. Bristol Inter.*, 1925.)
18. Account for the present economic position of any two of the following :—Sheffield, the Tyneside, Nottingham, Preston. (*Univ. Oxford Cert.*, 1925.)
19. "In eastern England geographical factors have largely determined that agriculture should be the dominant activity during many centuries." Discuss this statement. (*Univ. Oxford Cert.*, 1925.)
20. Divide Scotland into its major climatic regions, describing the climate of each. (*Univ. Oxford Cert.*, 1926.)
21. Discuss the geographical advantages possessed by the iron-smelting industry around the Tees estuary. (*Univ. Oxford Cert.*, 1925.)
22. Analyse carefully with the aid of sketch-maps the position and historical development of three of the following towns : Copenhagen, Berlin, Madrid, Constantinople. (*Univ. Sheffield Inter.*, 1925.)
23. Compare the value for export of coal as regards position and access to the sea of the coal fields of Great Britain. (*Univ. Sheffield Inter.*, 1927.)
24. Give a brief account of the coal and iron resources of France and of Germany, and examine the relative opportunities of these two countries for the development of metallurgical industries on a large scale. (*Univ. Bristol Inter.*, 1927.)
25. Analyse carefully the position and indicate the importance of four of the following : Salonika, Dijon, Rosario, Lisbon, Madrid, Burgas, Moresnet, Memel, Fiume. (*Univ. Bristol Inter.*, 1925.)
26. Discuss the economic potentialities of Yugoslavia. (*Univ. Bristol Inter.*, 1926.)
27. Trace the interdependence of physical factors and agricultural production in Holland. (*Univ. Sheffield B.Sc.*, 1925.)
28. Give an account of either the Rhine or the Danube as (a) an avenue of commerce, (b) a potential or actual political boundary. (*Univ. Sheffield B.Sc.*, 1925.)
29. Compare and explain the agricultural production of France and Germany. (*Univ. Sheffield B.Sc.*, 1925.)
30. Compare and contrast the relief, climate and agricultural products of the Po Valley and Wallachian Roumania. (*Univ. Sheffield B.Sc.*, 1925.)
31. Describe the geography of Poland, with special reference to (a) its economic life, (b) its political stability. (*Univ. Bristol Inter.*, 1924.)
32. Contrast the part played by climate in the economic life of (a) Great Britain, (b) Sweden, (c) Italy. (*Univ. Bristol Inter.*, 1924.)
33. Divide France into its major structural regions. Trace as fully as you can the influence of the geological structure and physical history of one of these regions upon its relief and drainage. (*Univ. Oxford Cert.*, 1927.)

34. Give some account of the influence of climate on human occupations in different parts of Great Britain. (*Univ. Oxford Cert.*, 1927.)
35. Examine the conditions and prospects of beet cultivation in the British Isles. (*Univ. Oxford Dipl.*, 1925.)

EXAMINATION QUESTIONS—GENERAL

1. Make a short study of any three of the following ports : Marseilles, Rio de Janeiro, Seattle, Bristol, Glasgow. (*Univ. London Inter. B.Sc.*, (*Econ.*), 1926.)
2. "The importance of a port depends mainly upon the extent and the productivity of its hinterland." Discuss this statement with special reference to Calcutta, Buenos Ayres, London, and Singapore. (*Univ. London Inter. B. Com.*, 1927.)
3. Describe the location of three of the following places, so as to explain the geographical reasons for their importance : (a) Buenos Ayres ; (b) Cape Town ; (c) Constantinople ; (d) Johannesburg ; (e) London ; (f) Winnipeg. (*Univ. Leeds Inter.*, 1926.)
4. Give a brief account of the principal features of the regions through which you would pass in a direct journey either from Algiers to the Gulf of Guinea or from New York to San Francisco. (*Univ. Leeds 1st Year*, 1927.)
5. Write a short geographical account of the cotton industry of the British Empire. (*Univ. Bristol Inter.*, 1924.)
6. Compare the economic effects of the construction of the Suez and Panama Canals, and point out the influence of geographical conditions upon their economic value and development. (*Univ. Oxford Dipl.*, 1925.)
7. "In western Europe all geographical factors combine to ensure variety of product and facility of commercial intercourse." Discuss this statement. (*Univ. London Inter. B.Sc. (Econ.)*, 1929.)
8. "Germany has no natural focussing point." Describe the major geographical divisions of Germany so as to bring out the truth or otherwise of this statement. (*Univ. London Inter. B.Sc. (Econ.)*, 1929.)
9. Write a short essay on geographical factors in the localization of industry, with examples from the British Isles. (*Univ. London Inter. B.Sc. (Econ.)*, 1929.)
10. Consider the distribution of producing coalfields in Germany and its relation to natural facilities for distribution and to important industrial regions. (*Univ. London Inter. B.Sc. (Econ.)*, 1928.)
11. Describe briefly the chief natural regions that go to make up present-day France, paying special attention to those which tend respectively (a) to isolation, (b) to unification. (*Univ. London Inter. B.Sc. (Econ.)*, 1928.)
12. Enumerate the chief geographical characteristics of the Mediterranean Sea and its coastlands, and sketch briefly its present-day significance to Great Britain. (*Univ. London Inter. B.Sc. (Econ.)*, 1928.)
13. Indicate the chief geographical factors in the evolution of the North-Eastern iron and steel industry (i.e. Durham and N. Yorkshire). (*Univ. London Inter. B.Sc. (Econ.)*, 1928.)
14. Analyse the geographical position of either (a) Glasgow, or (b) Hull. (*Univ. London Inter. B.Sc. (Econ.)*, 1928.)
15. Describe comparatively the features of relief along the chief lines of communication between Belgrade and seas to the west, south, and east. (*Central Welsh Board, Higher Cert.*, 1927.)
16. Either, Write notes on the trade relations of the four most populous cities of modern times on or quite near the coasts of the Mediterranean Sea, Rome and Constantinople being excluded.
Or, Discuss comparatively Rome and Constantinople as international centres. (*Central Welsh Board, Higher Cert.*, 1927.)

17. "The coalfields of Britain are so situated as to favour in a remarkable way the development of a coal export and bunker trade." Examine this statement critically and compare the situation in Britain with that in *either* the United States or continental Europe. (*Univ. London Inter. B.Sc. (Econ.)*, 1933.)

18. Give an account of the location and development of the dairying industry of the British Isles. (*Univ. London Inter. B.Sc. (Econ.)*, 1933.)

19. Write a geographical account of the timber and pulpwood resources and industry of *either* Canada or north-eastern Europe. (*Univ. London Inter. B.Sc. (Econ.)*, 1933.)

20. Describe briefly the geography of *either* California or New England. (*Univ. London Inter. B.Sc. (Econ.)*, 1933.)

21. Compare and contrast *either* France and Italy or Switzerland and Czechoslovakia as regards resources, population and economic development. (*Univ. London Inter. B.Sc. (Econ.)*, 1933.)

22. Give an account of the production of cotton and the cotton manufacturing industry in India or China or Japan. (*Univ. London Inter. B.Sc. (Econ.)*, 1933.)

23. Describe briefly the distribution of mineral resources and the exploitation of these resources in India or China or Japan. (*Univ. London Inter. B.Sc. (Econ.)*, 1933.)

24. Suggest a division into economic regions of *one* of the following: Brazil, East Africa (from Uganda to Nyasaland), Western Australia. Justify your division. (*Univ. London Inter. B.Sc. (Econ.)*, 1933.)

25. Discuss the localization of the manufacture of iron and steel in *either* France and Germany or the United States. (*Univ. London Inter. B. Com.*, 1933.)

26. Discuss briefly the distribution of population in the Indo-Gangetic Plain or the Hwang-Ho Basin or Japan. (*Univ. London Inter. B. Com.*, 1933.)

27. What considerations, based on geographical knowledge, do you think should be behind the policy of British automobile manufacturers concentrating on export to any extra-European countries? (*Univ. London Inter. B. Com.*, 1933.)

28. Discuss the situation of New Zealand in so far as it affects economic development and foreign trade. (*Univ. London Inter. B. Com.*, 1933.)

29. Give an account of the mineral resources and the present production of minerals in Canada. (*Univ. London Inter. B. Com.*, 1933.)

30. Indicate *either* the geographical conditions that have tended to cause France to remain a predominantly agricultural country or those that have favoured the greater development of manufactures than of agriculture in New England. (*Univ. London Higher School Exam.*, 1933.)

31. Suggest and justify a division into geographical regions of *either* the United States east of the Mississippi or the Iberian Peninsula. (*Univ. London Higher School Exam.*, 1933.)

32. Examine the nature and the present extent of the manufacturing industries of Japan, and also the prospects for their future development. (*Univ. London Higher School Exam.*, 1933.)

32. "Relief has a marked controlling influence upon the climate and the human geography of New Zealand." Discuss this statement. (*Univ. London Higher School Exam.*, 1933.)

34. Attempt and justify a division of Canada or British South Africa or Brazil into geographical regions. (*Univ. London Higher School Exam.*, 1933.)

35. Select two leading ports of Australia or of the Union of South Africa or of Canada or of Argentina and Chile, and describe the internal communications, the hinterlands and the export trade of each. (*Univ. London Higher School Exam.*, 1933.)

36. Describe the mineral resources of Canada or of British South Africa with special reference to the present development of mining industries and the outlook for them in the future. (*Univ. London Higher School Exam.*, 1933.)

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The numbers in black type refer to passages that contain more than an incidental mention of the subject of reference. Conventional abbreviations are used to save space, as, *e.g.* Arch. = Archipelago; Mts. = Mountains; pop. = population; Ry. = Railway, etc.

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